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ABSTRACT

The purpose of this conference was to focus attention on the increasing role of distance learning in academia and industry and to inform and educate the participants in several key aspects of distance learning. In addition, the conference spotlights the accomplishments of technology in education and showcases the many leaders in distance learning. The first part of this document is a list of proceedings in alphabetical order, followed by conference highlights, keynote speakers, concurrent sessions, and other information. The conference schedule is also provided. This proceedings includes the following papers: "Using the Web To Create a Collaborative Learning Environment: A Workshop Incorporating Technology in Freshman Composition" (Denise C. Camin); "Making Web-Based Instruction More Relevant: Lessons from a Research Study" (Mei Mei Chang, Jim Lehman); "Learning Anytime Anyplace: A Professional Development Certification Model for Distributed Information Security Education" (Doris Choy, Tristan E. Johnson, Melissa J. Dark); "Sense of Community in a Distance Education Program" (Melanie Misanchuk, Bill Dueber); "Guiding Students to Success in Online Courses-The Buck Starts Here" (Gloria Edwards, Mei-Mei Chang); "Learning Communities, On-Line Work, and Diversity Issues n a Small Residential College" (Charles Graessle, Vosjava Muca, Cynthia Noyes, Sophia Wilson); "e-Consultant: Development of Web-based Interactive Databases for IP Based Instructional Tools" (Tristan Johnson, David Wenhao Huang, Rabih Razzouk); "Online Education Does Not Have To Mean A Lonely Learner" (Henry Kelly); "Professional Storytelling Online" (Marcia Rucker Shannon, Daniel Tyger, Mary M. Graiver); "Supporting Group Problem-Solving Online: A Exploratory Study of Computer-Mediated Collaboration" (Amy S. Wu, Rob Farrell, Mark K. Singley); "A User Analysis for Web-based Distance Education" (Byeong-Min Yu, Kyong-Jee Kim, Seak-Zoon Roh); and "The Effect of Different Menu Styles on the User's Perception and Performance on the WWW" (Byeong-Min Yu, Seak-Zoon Roh, Sungwook Han). (AEF)

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# Purdue University Calumet

presents

# Topics on Distance Learning

June 5 and 6, 2001
Hammond, Indiana

## Proceedings 2001

Click here for Topics on Distance Learning 2000 online proceedings

Proceedings are arranged in alphabetical order by first author.
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| **Doris Choy**<br>**Tristan Johnson**<br>**Melissa Dark**<br>Purdue University - West Lafayette | *Learning Anytime Anyplace: A Professional Development Certification Model for Distributed Information Security Education* |
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| **Byeong-Min Yu**<br>**Kyong-Jee Kim**<br>**Seak-Zoon Roh**<br>Indiana University - Bloomington | *A User Analysis for Web-based Distance Education* |
| **Byeong-Min Yu**<br>**Seak-Zoon Roh**<br>**Sungwook Han**<br>Indiana University - Bloomington | *How can we Design the Effective Interface and Information Structure for an Integrated Web-based EPSS?* |

**Byeong-Min Yu**
**Seak-Zoon Roh**
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Indiana University - Bloomington

*The Effect of different Menu styles on the User's perception and performance on the WWW*

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Topics on Distance Learning 2001
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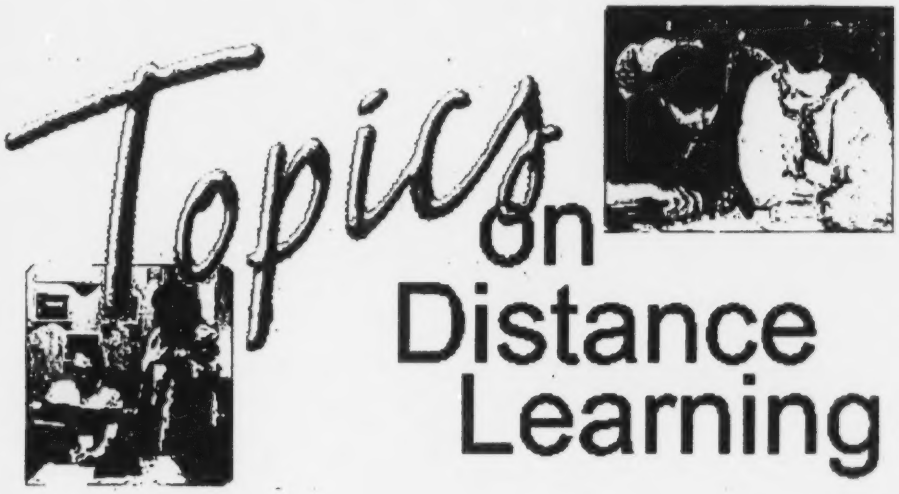


**June 5 and 6, 2001**
**Hammond, Indiana**

The Topics on Distance Learning conference offers you a chance to explore the latest in distance learning techniques and technologies. With over thirty sessions to choose from on a variety of topics, you will be able to design your own conference experience.

## Conference Highlights

- **Howard Strauss** -- Tuesday Keynote's Presentation

*The Future of the Web, Intelligent Devices, and Education.*

- **David Brown** -- Wednesday Keynote
  *Customized Interactive Learning That's More Effective Than Face-to-Face Classes*
- **Evening at the Empress Casino** Tuesday Night
- Over **twenty-five concurrent sessions** from which to choose
- **Featured Track: Enrollment Services Center: Serving the Needs of Students Online** an IBM Best Practices Award Winner
- **Networking** with colleagues involved in teaching at a distance
- Ability to **Share Information** with others

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Do not hesitate to register, as the deadline for reduced registration is May 18, 2001.

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# Topics on Distance Learning

Purpose of Conference | Keynote Speakers | Concurrent Sessions
Posters | Evening on the Empress | General Information

## Purpose of Conference

The purpose of this summer conference is to focus attention on the increasing role of distance learning in academia and industry and to inform and educate the participants in several key aspects of distance learning.

In addition, this conference spotlights the accomplishments of technology in education and showcases the many leaders in distance learning. As a participant you will be surrounded by some of the leading people in the field, giving you the opportunity to see, hear, and learn what you can use to enhance your own teaching.

## Keynote Speakers

To begin the conference, we are very fortunate to have Howard Strauss, Manager of Academic Applications at Princeton University, present "***The Future of the Web, Intelligent Devices, and Education***."

Wednesday's conference will begin with a presentation by Dr. David Brown, Vice President and Professor of Economics and Dean of the International Center for Computer Enhanced Learning at Wake Forest University, titled, "***Customized Interactive Learning That's More Effective Than Face-to-Face Classes***."

## Concurrent Sessions

We will have thirty plus concurrent sessions in a variety of areas available for the participants to gain the most from this conference. Whether you are an instructor, designer, trainer, teacher, or administrator in education or industry there is sure to be something for you to gain through participation.

Conference Schedule
Online Proceedings

Opening Keynote Speaker
Tuesday Morning Sessions
Tuesday Afternoon Sessions

Wednesday Keynote Speaker
Wednesday Morning Sessions
Wednesday Afternoon Sessions

Featured Track:
Enrollment Services Center: Serving the Needs of Students Online
an IBM Best Practices Award Winner

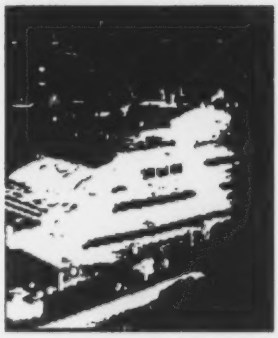
## Posters ⮝

In addition to various vendors, we will have a number of people with a variety of experience in the field present posters of what they have done and learned in the process of working with technology in helping educate and teach.

## Evening on the Empress ⮝

The perfect way to extend the conference experience and network - join us for an evening of food, fun & games. Meet & mingle while enjoying the gracious hospitality of the Empress Casino Hammond.

For a $12.00 reservation fee, you will receive dinner at the all-you-can-eat, award winning buffet, $5.00 in gaming tokens, and transportation to and from the casino and campus. This package basically provides you an elegant evening aboard one of the newest luxury casinos in the area for a nominal fee.



Transportation will be provided to & from the Calumet campus to the Empress throughout the evening on the hour, with the last shuttle leaving the Empress at 10:00 pm.

To reserve your spot on the Empress Casino, check that you would like to attend on the registration form and submit your registration fee of $10.00.

## General Information ▲

The conference will be held on Tuesday and Wednesday, June 5 and 6, 2001, on the campus of Purdue University Calumet. The majority of the sessions will be held in the Student Faculty Library Center at the heart of campus.

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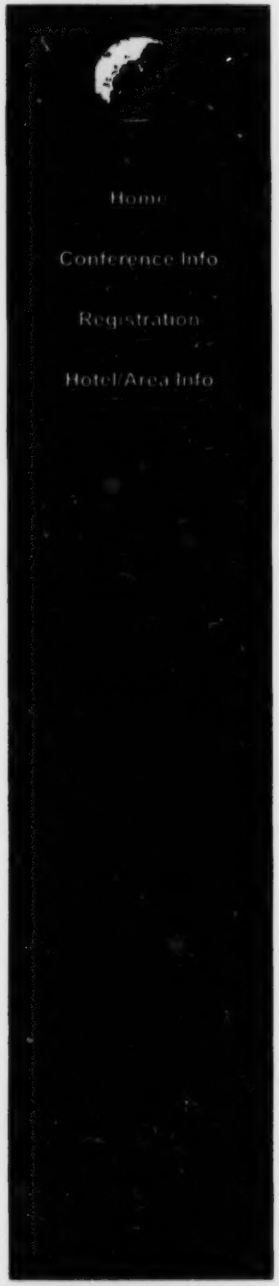
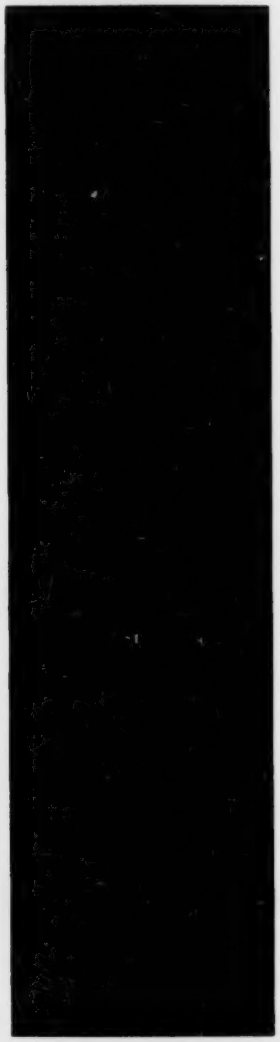



# Purdue University Calumet
## Topics on Distance Learning

Cost of the conference is $70.00, before May 18, and covers the cost of program materials, lunch on both days, breaks, and access to the on-line proceedings. After May 18, the cost of registration will be $100.00.

| | | | | |
|---|---|---|---|---|
| | ***Tuesday, June 5*** | | | |
| 7:00 - 9:00 am | Set-up Posters/Exhibits/Presenter Check-in | | | |
| 8:00 - 9:00 am | Registration / Coffee / Refreshments | | | |
| 9:15 - 9:15 am | Conference Welcome | | | |
| 9:15 - 10:45 am | **Keynote Address**<br>Howard Strauss<br>***The Future of the Web, Intelligent Devices, and Education*** | | | |
| 11:00 - 12:00 am | Professional Storytelling Online | "Context-ing" The art of designing distance learning for interaction and impact | Using the Web to Create a Collaborative Learning Environment | A Primer on On-Line Cheating |
| 12:30 | | | | Break |
| 12:30 - 1:30 pm | Lunch / Posters<br>e-Consultant for IP Based Instructional Tools<br>Learning Anytime Anyplace:<br>A Professional Development Certification Model for Distributed Information Security Education | | | |
| 1:30 - 2:30 pm | Dealing the Cards so Everybody Wins: Matching Pedagogical Goals and Asynchronous Collaboration Strategies | The Role of Integrated Distance Technologies in Foreign Language Instruction: A case study of Haitian Creole at Indiana University | Teaching Graduate Education Methods Courses Through the Internet: As Effective as Traditional? | Lessons Learned: A review of attitudinal, administrative, and academic challenges for first time distance learning users |
| 2:30 - 3:00 pm | Ice Cream Break | | | |
| 3:00 - 4:00 pm | A User Analysis for Web-based Distance Education | Online Education Does Not have to Mean a Lonely Learner | Supporting Group Problem-Solving Online: An Exploratory Study of Computer-Supported Collaboration in AlgebraJam | 2001: A Classroom Odyssey |



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| 4:30 - 10:30 pm | Night at the Empress<br>First van leaves at 4:30 pm<br>Last van will leave the Empress at 10:00 pm |

| ***Wednesday, June 6*** | | | | |
|---|---|---|---|---|
| 8:30 - 9:00 am | Breakfast | | | |
| 9:00 - 9:10 am | Welcome and Announcements | | | |
| 9:10 - 10:15 am | **Keynote Address**<br>David Brown<br>***Customized Interactive Learning That's More Effective Than Face-to-Face Classes.*** | | | |
| 10:30 - 11:30 am | How can we Design the Effective Interface and Information Structure for an integrated Web-based EPSS? | Guiding Students to Success in Online Learning - The Buck Starts Here | Now What: How Do I Actually Conduct the Class Now that I'm Finally Online? | **Featured Track**<br>Enrollment Services Center: Integrated Service Online as In-Person |
| 11:30 - 12:30 am | Lunch | | | |
| 12:30 - 1:30 pm | Learning communities, on-line work, and diversity issues in a small residential college | Veterinary Technology Distance Learning: Decision, Barriers, and Conversion: Is online learning suitable for your course? | Psychological Sense of Community in a Distance Education Cohort | eEnrolling: Electronic Admissions, Registration, and Financial Aid |
| 1:45 - 2:45 pm | Making Web-Based Instruction More Relevant: Lessons from a Research Study | The Effect of different Menu styles on the User's perception and performance on the WWW | Web Site Design: A Critical Component of Good Pedagogy | eSupport: CAPP (Online Curriculum Advising and Program Planning), Searchable Transfer Articulation, and Student Records |

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Using The Web to Create a Collaborative Learning Environment:
A Workshop Incorporating Technology in Freshman Composition

Denise C. Camin
DeVry Institute of Technology
June 5, 2001

This workshop focuses on one assignment used in my freshman composition course. Originally designed to use in my Research and Writing course, Engl 105, on the Purdue Calumet campus, I've found the basic premise works well, so I've since modified it to use in various courses, although the main focus of using technology to create a collaborate writing environment has not been altered.

**The Collaborative Science Project: Introduction**

The purpose of this assignment is to expose students to group writing and problem solving, introduce them to the scientific method and using Excel to illustrate results, and create opportunities for them to learn responsibility.

The collaborative essay project had been the second in my English 105 course at Purdue, focusing on a "science project," but is now the third essay in the sequence for my DeVry courses, focusing on a "business or technology problem." The timing allows students the opportunity to work with classmates in advance of the group project.

Students are grouped to design and administer an experiment, draft a paper as a group, chart results, review other group papers, and revise the project for grading. While I have grouped students using different methods, I prefer letting students group themselves, giving the caveat that groups have no more than four members and letting groups form at that point. I agree with Richard Pregent (1994) who believes students should be allowed to make choices in group situations if they are familiar with members of the class since this adds to the idea of student responsibility for the project. Absent students are either included by friends or left to fit themselves into groups before the next class session. Because students have the opportunity to choose their group members, they become responsible for problem-solving disputes among participants and other group issues.

In preparation for beginning, everyone is to have read the assignment prior to the class when groups are selected, and after groups have formed, students are assigned the task of choosing an "experiment" for their project. Typically, I use a sample experiment as a means of generating interest and modeling the process. Once we replicated an experiment based on touch therapy, another time focused on the tootsie pop question, and recently we completed a "microtheme" activity based on floatation principles.

Groups brainstorm using the computer to generate ideas for projects by using the discussion forums on the web site or musical computers – listing ideas

for five minutes, moving to the next computer to repeat the process, and doing this for four computers before returning to the 1st computer. Sample papers from former classes are made available for viewing online, ideas are discussed in class, and groups chose to either replicate a past experiment or create one of their own, but the decision must be made and agreed to by the entire group at that point. Students then begin the planning process as a group, determining what they will do, how they will do it, when and how they will meet, and who is responsible for which tasks. A basic plan is due at the end of the class session.

The following class session is used to complete the experiment or design and administer a survey. Some choose to meet in the classroom, some meet elsewhere, and others choose to meet online. The only restriction is the task must be completed within the time period given (one week), and group members must bring their data to class in order to begin the first draft of the group report.

When we meet as a class one week later, any questions are discussed during the first part of class, and groups begin writing the first draft. It is imperative that groups meet prior to this, even if they've divided the task, to determine how best to use this lab session. Most cannot complete the 1st draft during the time given, so decisions must be made as to how best to complete the 1st draft in preparation for peer review.

When groups meet the following week to do peer review, 1st drafts have been posted to the online forum. Peer review is a group effort completed during lab. After, they are directed to review their own 1st draft reviews, discuss the feedback either online or in person, format a plan for revision, begin working on the final draft, and create charts of their results.

When the process is finished, the final project is submitted for grading: all planning materials, the 1st draft, the survey and/or data collected, a revision plan, two charts illustrating the results, and the final revised lab report. Projects are graded and returned the following week. The project grade, times the number of group members, is the point value for distribution. Students e-mail their group member grade evaluations to me within a week, following the guidelines on the assignment. Students are warned that late or incomplete grade forms will not be added into the grade formulation. Based on the student feedback, averages are completed for every student and revised grades are posted online.

**Technology & Collaboration**

The collaborative science project uses technology in a number of ways. The group is assigned the task of doing the experiment, but the method and choice of experiment is left up to the group. For example, groups can choose to meet online rather than in person to accomplish the experiment, or groups can use the online medium to do the experiment. One group used the Internet to search for a project idea and chose an experiment using a puzzle found on the web. They then used the e-mail function of the class web site to contact

students in all of my English 105 classes in order to collect the data needed. Another group used the Internet as the idea for the actual experiment and data collection. This group hypothesized that since I required students in my English 105 classes to check their e-mails at least once each week and prior to Tuesday, their classmates would have a better response time for e-mail messages than their families and friends. This group composed a message, sent the e-mail to all of my English 105 students and to their respective families and friends, and tracked the responses as they came back. One member of the group, an older student with computer expertise, embedded a link in the e-mail message to make it easier for respondents to contact the group.

Online communication enables working students to keep in touch, so absenteeism is less of an issue in the group process. E-mail gives group members the opportunity to work on the project outside of class instead of waiting for class sessions to discuss problems. This project utilizes online peer review to give groups feedback on their reports, once more exposing students to written communication as an activity in and of itself. The experience working with Excel not only shows students how words and graphics correlate but also provides them with real world applications of technology.

Using e-mail to assign group members' grades eliminates the worry of hurting someone's feelings, facilitating student grading based on effort and responsibility rather than personality. E-mail has also makesit possible for students to contact me regarding problems they might be afraid to broach during class, and sometimes they use this medium to ask for advice on how to address another student in the group when problems arise.

Posting sample papers online helps students see what others have done, and the brainstorming activity early in the process helps students see technology as a mode for thinking and planning as well as writing the finished project. Posting 1st drafts of their own papers online helps students take a greater responsibility for their own writing, and working as a group becomes easier with the addition of e-mail and forums.

An unexpected benefit involved one group at Purdue with mixed technological ability and the team feeling generated by the assignment. The group project was begun while I was at a conference in South Carolina. This group used the class session to meet and do the experiment, but since theirs was the e-mail assessment, they completed the task quickly. Since two members of the group were unfamiliar with e-mail, the other two helped them establish e-mail accounts to send me a note. This team spirit continued through the project, spilling over into the rest of the semester.

**Problems Encountered/Possible Solutions**

Palloff and Pratt (1999) advise that conflict is good because students need to learn problem-solving methods. This activity has countless opportunities for problems since the responsibility for all of the tasks rest with the students. My

initial reaction has often been to "save" some of them from each other, but this does not help students learn to work with others and creates greater dependency on "the teacher." Even though it is hard, groups need to work through conflicts to resolve issues on their own. However, instructors need to intervene to help them do this without creating more problems. Like peer review, the potential for student responsibility creates additional opportunities for conflict but also for learning to find solutions.

I added the group grades to illustrate the importance of responsibility to the group members rather than myself, and often this has helped, but since human nature is a large part of the process in any group situation, there will always be conflict when students work together to accomplish a task.

Collaborative writing activities, which include technology, not only expose students to real world opportunities for communications but also offer the chance for meaningful class assignments. Experiences problem-solving group papers, working with group members to learn computer functions, meeting online and using the Internet to clarify communication, and having the opportunity to try these things in the safety of academia better prepares students for careers after graduation as well as current employment functions.

**References**

Pregent, R. (1994) *Charting your Course: How to Prepare to Teach More Effectively.* Madison, WI: Magna Publications.

Palloff, R. and Pratt, K. (1999) *Building Learning Communities in Cyberspace: Effective Strategies for the Online Classroom.* : Jossey-Bass.

# Making Web-Based Instruction More Relevant: Lessons from a Research Study

Mei Mei Chang and Jim Lehman

## Introduction

Online learning is currently a hot issue. The use of the World Wide Web has become a popular approach for information delivery. Because of the availability of the Internet, teachers are excited about making a good use of this feature. Learners can access information anytime, and this benefits learners' time management. Learners can choose their best time to access the course website, and they can review the content as many times as they need to. The abundance and convenience of online resources indeed provide an efficient learning environment. However, the relevant literature indicates that there is still lack of concrete evidence to show the effectiveness of this medium in assisting teaching and learning (cited in Lu, Zhu, & Stokes, 2000). Researchers point out that there have been only a small number of empirical studies that attempt to examine the quantitative effects of hypermedia usage on learning outcome (Dillon & Gabbard, 1998).

Maintaining the interest of students online is a big challenge for teachers. Thus, how teachers integrate effective instructional strategies into online courses to maintain students' learning motivation is very important. O'Hanolon (1999) suggested that (1) web content should be designed to facilitate easy scanning, and web pages should contain only 50% of the word count of paper equivalents; (2) well-structured quizzes are a valuable tool to motivate students to complete courses; and (3) more advanced or interactive features are recommended for facilitating students' online learning.

Study

This experimental study was designed to examine the effect of a web-based instructional lesson for foreign language learners enhanced with relevance components of Keller's ARCS model.

The instructional material used in this study was created using Microsoft FrontPage, HTML, and Macromedia Dreamweaver, and designed for access via Microsoft Internet Explorer. Based on the Relevance Concept and Tactics Checklist developed by Keller (1990), two versions of the instructional lesson were created: one with embedded relevance strategies and the other without. Digitized video segments and appropriate instructional content were integrated based on the concepts and rationale of communicative competence and instructional design principles. Exercises with feedback were provided for both the control group and the experimental group.

In this program, the video provided examples and information about the concept of criticism (knowledge) and provided guidance for how to deal with the conflict (skills) to enable learners to communicate functionally and interactively. Problem-solving exercises that created an environment for learners to practice how to convey and interpret messages and to negotiate interpersonally were given to the experimental group. In order to make sure that no extraneous variables would affect the result, the structure of two different versions of the program was the same except for the embedded relevance strategy.

Students, categorized as having a higher or lower level of intrinsic motivation based on the score of Intrinsic Motivation Orientation Scale, studied one of two versions of a web-based lesson featuring English language text, videos, and exercises. After finishing the instructional lesson, students were asked to take the comprehension test and to fill out the Modified Instructional Material Motivation Survey.

## Results and Discussion

Results showed that students who used the enhanced relevance version had significantly higher perceptions of motivation ($F=15.35$, $p = .0001$) and scored significantly higher on a comprehension test ($F=44.46$, $p = .0001$) than did students in the other group. The results of this study suggest that instructors can enhance the effectiveness of web-based instruction by integrating relevance components into their web-based learning materials.

The results might be explained by recent research which has indicated that learners' sense of relevance increases their use of cognitive strategies that improve learning (McKeachie, Pintrich, & Lin, 1985; Pintrich, 1989) and enhances academic performance (Mean, Jonassen, & Dwyer, 1997). It also supports Keller's (1983) theory of motivation, which argues that learners' motivation can be influenced, and the ARCS model, the motivational-design model, provides a useful set of strategies for improving motivation.

The study results imply that Keller's ARCS model can be used as a framework for enhancing the relevance of online instructional materials. The concepts and tactics of the ARCS model can be applied when designing different distance learning courses, such as web-based online instructional materials. However, instructors should do a needs assessment before designing the instruction, apply different instructional strategies for different learners, and use tactics appropriate for the levels of learners.

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# Learning Anytime Anyplace: A Professional Development Certification Model for Distributed Information Security Education

There are an increasing number of organizations utilizing information technology in all aspects. The increasing interdependence of computer systems is leading to increased security challenges in areas such as hacking, theft, as well as accidents. The following trend were cited (Accenture, 2000) as those that will create considerable security challenges in the future:

1. Billions of devices proliferate that are always on and always connected.
2. Complex outsourcing relationships extend trust boundaries beyond recognition.
3. International criminals exploit lack of cooperation and compatibility in international laws.
4. Privacy concerns will continue to compete with convenience and desire for features.
5. "Time to Market" increases pressure to sacrifice security and quality of software.
6. Lack of security skills will compound weaknesses of delivered solutions.

Thus, information security is becoming an important issue not only for the information technology specialists, but also for every computer user in an organization. Additional information security education is in great demand for a diverse and dispense audience. However, there is critical shortage of prepared educators and educational programs to meet the demand. Moreover, employers hesitate to put employees into classrooms to learn about information security because of a large amount of loss in work time and productivity. Potential learners may not be able to attend regular classroom courses due to other job and personal responsibilities. Therefore, a distributed educational program is seen as a viable means of utilizing scarce existing resources to meet this demand. The development of learning anytime anyplace information security education model combines content resources, such as books and instructional materials, and interactive activities with the instructor and other learners in an online environment. The model includes distributed learning specifications through standardization and customization.

Standardization is critical to the development of distributed educational programs in order to create distributed programs that are more efficient, scalable, and portable. Standardization is essential in:

1) Setting competencies within the course curriculum.
2) Designing the content of the course.
3) Assessing learners' performances before, during, and after the instructions.
4) Developing LAA instructions in a cost-effective manner.

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Customization is critical for promoting effective learning for diverse groups of learners who have diverse learning needs, styles, and goals. Since learners differ greatly in ability, as well as in mastery of learning skills, uniform standards cannot be uniformly challenging for all learners and cannot help to accelerate learners' performance (Reigeluth, 1997).

The learning anytime anyplace environment will provide flexibility to learners as they would be able to access the course materials at their own convenience. They would be able to learn anytime as long as they have a computer and Internet accessibility. Interactivity can be maintained because learners can interact with peers and instructors either synchronously or asynchronously. The cost of training to the employer decreases as traveling cost to and from classrooms is totally eliminated. The learners do not need to travel to a specific location and at a specific time in order to receive education. This would increase the number of learners who would be able to participate in the education.

Effective learning anytime place occurs when learners are self-motivated and learning goals emphasized on developing learners' metacognitive and critical thinking skills. Various learning strategies such as individual pacing; meaningful and timely feedback; and cooperative learning are applicable to earning anytime anyplace education. When combining standardization and customization within the learning anytime anyplace education, learners will be able to learn efficiently and effectively.

The purpose of developing a professional certification program for information technology is to provide credentials to those who have the competencies and skills related to information security. This would enhance to employment opportunities of the individuals with occupational specialties. Learners can choose from a variety of certifications of information security that are most applicable to their professions. Some examples of certifications include: information security; system access control; physical and environment security; personnel security; security organization; communications and operations management; security policy; intrusion detection; and etc. As a result, different employees from various organizations will have opportunity to select the most appropriate course and pursue the certification that would be most applicable to their jobs.

Each certification will be developed by first identifying the competencies of the course. Various stakeholders and subject matter experts will develop the competencies by task analysis. Second, the course curriculum will be designed according to the determined competencies and aligned

with the certification examination. Learners who are interested in the specific certification will have access to the course materials. They would receive education through the learning anytime anyplace online environment. Course materials would be online and learners will be able to communicate with the instructors and other learners via electronic mails, bulletin boards, and real-time discussion sessions. After the learners completed the course, they can take the certification examination that is designed according to the competencies of the course. As the learners successfully completed the exam, certification will be granted to verify their expertise in the specific area. Each course will be evaluated at every stage during the development process, when determining the competencies; when designing the curriculum; and when designing the final assessment, to ensure the quality of the course.

As more and more learners participate in the certification program and individuals are obtaining multiple certifications. The certification program could be developed into a comprehensive graduate degree certification program. Learners will determine the specific emphasis that they would like to pursue. Then, they would take certain courses that are related to their determined emphasis. At the end of the degree seeking process, learners will conduct information security research projects related to the emphasis.

Information security is a growing challenge for various business and organizations. Therefore, information security education is in great demand. The development of learning anytime anyplace education is one of the best solutions to solve the current challenge in a cost effective manner. The online learning environment provides learning opportunities to everyone who has Internet access. Moreover, interactivity would not be sacrifice because learners have the ability to communicate with other learners and the instructor effectively online.

# Sense of Community in a Distance Education Program

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Bill Dueber

The advent of the World Wide Web has brought with it a massive proliferation of distance education options, many of them based around extensive online communication. Unlike the correspondence courses from which they spring, this new brand of distance education features opportunities for extensive student-student and student-teacher interaction, a radically different economic model, and often a long-term commitment between the student and the offering institution.

Despite these opportunities, creating a successful and sustainable distance education program has been shown to be a difficult task (Carr, 2001). One of the most prevalent barriers to success in distance education courses is a *sense of isolation* (Morgan & Tam, 1999). Students in distance education courses, cut off not only from in-class interaction but also from serendipitous encounters with their classmates and peers, lose the sense that they are part of a community and the feeling that they *belong* to something.

One potential avenue through which these concerns can be addressed is through the formation of a *learning community* (Schwier, in press; Palloff & Pratt, 1999; Everhart, 1999) specifically by engendering in students feelings of *belonging*. Benefits of community include a reduction of student burnout (McCarthy et al., 1990) and a decrease in the effects of other barriers to distance learning The existence of a community of learners eases the process of socializing students into the profession and helps them to create networks with future colleagues (Haythornthwaite, 1998). Community has also been linked to a general improvement in performance, especially with respect to instilling the practice of life-long learning (Brown, Collins, & Duguid, 1989; Cross, 1998; Vygotsky, 1978).

Given these pedagogical and economic benefits, the next question is obvious: what attributes of a course or a program influence these feelings of community? Our study is a qualitative investigation of a coherent cohort of students in their first year of a three-year online Master's program in educational technology. Covering the first year of the program's existence, this study endeavors to describe "feelings of belonging" in the students, one of the most basic aspects of a sense of community as defined throughout the literature by McMillan and Chavis (1986). Following the case-study methodology as espoused by Silverman (2000), we examine documents, transcripts of online chats and asynchronous discussion; administer surveys; and interview students in the program in our effort to build a coherent model of the sense of belonging and what course- and program-level characteristics affect it.

The group of students studied is the Fall 2000 cohort of a distance Master's degree in Educational Technology offered at a large Midwestern university. Half the original 17 (now 13) students live in the same state in which the university is located; the other half cover three time zones. The gender divide is about equal, and the cohort is evenly divided up among those interested in K-12, higher education, and corporate work.

The students began the program with a four-day onsite orientation at the host university two weeks before the beginning of term. We structured this orientation in order to give the students a chance to meet each other and their professors. During this time, they formed project teams and begin to learn together in a face-to-face context before going back to their homes. The students participated in workshops on teamwork, group dynamics, working at a distance, and use of specific technologies.

The two courses under study (one per semester) are interesting counterparts in that they provide very different structures with respect to student-student and student-instructor interaction. The first semester's course (C500, covering instructional design) consisted entirely of work in small groups. In addition to the interaction necessary to work on these small-group projects at a distance (e-mail messages, phone calls, postings in an asynchronous discussion forum, real-time chats), the students were expected to attend a weekly "chat" session in which the entire cohort and the instructor participated.

The course given during the second semester stands in stark contrast. In C600 (a production-oriented course), all work is individually assigned and graded and the instructor provides no special structures or scheduled interaction for formal student-student or student-instructor communication. All interaction during this second course, then, is entirely voluntary.

Our questions center around the role the different course structures played with respect to the sense of community in the cohort. This study is currently in the second of two semesters; data are still being actively collection and analyzed. Based on our initial analysis of data collected during the fall of 2000 and the end of the spring 2001 term, we feel comfortable making some assertions that are being explored further.

It seems clear that the four-day face-to-face orientation was necessary to establish trust and working relationships between the students. Interviewed students uniformly emphasize the importance of that initial orientation. Students also feel the electronic media used to communicate with each other encourage a task-orientation; several actively worked to create opportunities for more affect-oriented interaction.

We expect that as we further explore the data, we'll find higher feelings of belonging during the first semester course; not only is the first semester closer to the four-day onsite orientation described above, but the teamwork format of the course mandated a high level of interaction. Group work, however, may also have a counter-effect; it is possible that the formation of tight cliques will have interfered with cohort-level feelings of belonging in the first semester, and that the opportunity (and perhaps necessity) of intentional interaction on a one-to-one basis among the students will create a stronger sense of belonging to the whole group (as opposed to "the team"). Because of these competing contexts, our survey questions and interview protocols endeavor to reveal not only the patterns of interaction, but also the students' perceptions of the motivation for the changes in interaction.

Feelings of belonging also seem to be cyclic; it may be possible to schedule interventions that correspond with the low points in these cycles. We will explore these issues as we finish our analysis in the coming weeks.

Our preliminary findings indicate that students feel a strong sense of membership in the cohort. Students report that being a part of the group is important to them and that they feel they belong. The indicators of influence seem to be fluctuating: during the first semester, students appear to have more influence over the course than the program; during the second semester, they feel more influence at the program level than the course level. Indicators of fulfillment of needs are very difficult to determine; much of the helping behavior indicative of this category occurs in private, one-to-one interaction. There is very little evidence of shared emotional connection at a group level. Some students report an emotional connection with a few people, most often those with whom they were on a team in first semester. When evidence of an emotional connection did exist, much of it could be traced to the shared even of the four-day orientation.

Given these findings, we strive to find ways to increase the sense of community among members. The "tools" with which we can work are: the four-day, face-to-face orientation, influence over pedagogical and structural elements of the courses, ability to set up asynchronous conferences as we see fit, all "normal" electronic communication media. In order to strengthen feelings of membership at a group-level, we will offer more small-group activities during the face-to-face orientation, and discourage commuting. In order to "mix up" the student interaction, some of the non-project assignments will be group-based (peer-review, discussion, etc.). We will endeavor to be more explicitly open to student influence on the course. We will formally gather student input on course offerings and program questions. Instructors will be as flexible as possible on due dates and project topic choices such that students can better integrate their student life with their work life. Need fulfillment can be addressed by reducing barriers to student-student interaction. To this end, we will simplify the asynchronous conferencing spaces, create spaces and lists that are explicitly private, and make student-student communication part of the assignments. We will promote shared emotional events on a regular basis, beginning with the orientation, where we will focus more strongly on the social activities. We will provide mechanisms through which students can share their work (an online mini-journal) and create an online equivalent to the colloquium series.

We are only at the beginning of our research on the status of community in the Distance Master's cohort. This summer, we will examine students' reactions to new students being in class with them for the first time (in two elective courses), and to their first non-IST course. Additionally, the IST course this summer will be taught by two professors in Korea, which may bring up some other time-zone and intercultural issues. We would like to extend this model with more quantitative measures, including administering the Sense of Community Index consistently, counting private interactions between students, and administering sense of belonging surveys. We are also envisioning integrating this model with social network analysis.

Because we have a new group of students starting the program this fall, we will be able to implement the changes we addressed in this paper, then evaluate how effective these strategies were for fostering community in a distance learning environment.

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# Guiding Students to Success in Online Courses – The Buck Starts Here

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## Abstract

Students participate in online courses for various reasons; however, many may steer away from quality learning experiences in cyberspace when attrition rates are made public and sometimes used as indicators of success. While the potential for learning in cyberspace is still in its infancy, overall student success is actively being questioned. So before the class begins, before the instruction is delivered, before the assessment and feedback is provided, and before the first student drops the course; let's start them off with a "Guide to Success" and facilitate the learning process.

## Background

It is no secret. Institutions of higher learning have no choice but to aggressively compete for the pool of qualified students seeking postsecondary educational opportunities (Oblinger, 2000). The World Wide Web (WWW) as an instructional medium has stiffened that competition by providing a framework for learning at a distance that fits the lifestyle of potential students and the budgets of colleges and universities (Oblinger, 2000). As we struggle with issues of how to provide quality instruction online, (Institute for Higher Education Policy, 2000) increase student retention (Kubala, 1998), and present evidence that comparable learning can actually take place outside of the traditional classroom (de Verneil and Berge, 2000), we are reminded that that name of the game is learning and not technology (Willis, 2000). Unfortunately, the latest news on student retention is not good (Carr, 2000). As we consider the cost of failure for both students and the institutions serving them, our best option is to implement strategies that increase the probability of retention and success (Edwards, 2001). All things being equal, if a quality product is provided, the students will come. The goal is to keep them. So, before the class begins, before the instruction is delivered, before the assessment and feedback is provided, and before the first student drops the course; why not set the stage for success?

## Setting the Stage

In the fall of 2000, sixteen students registered for a graduate level, online course (Educational Applications of the World Wide Web) that had been taught as a traditional on-campus course for the

previously two years. Fourteen of them had never taken a course that would be delivered totally online. Each registered with his/her own expectations and perceptions of the anticipated learning experience. Unbeknown to them, two years of research and practice had gone into the design and development of the online course. Strategies for student retention had been investigated and were in place. Both experience and the research suggested a need to make the course very student centered, and to allow students to build and contribute to their online community. Although some hard skills (i.e., basic computer literacy) were a prerequisite of the course, a major focus was placed on helping students build soft skills (i.e., collaboration, communication, teamwork, and leadership) that would contribute to their success. And more importantly, before the class began, before the instruction was delivered, before the assessment and the feedback were provided, and before the first student dropped the course, each student was required to attend a one-time, on-campus "Guide to Success" orientation to the online course. The stage was set.

The Journey to Success

The mandatory "Guide to Success" orientation was a two-hour, face-to-face meeting where students were oriented to the online course, netiquette, time management strategies, and tips for staying motivated. They also met the course facilitators and other students face-to-face. Students completed three online questionnaires, which provided data on who they were, the skills they possessed, and most importantly, what they expected to learn. This single, face-to-face meeting took away much of the anxiety and stress the students were experiencing. They were able to login to the course and received an overview of the course interface. Navigation was logical and simple, as everything had been designed to be "point and click" ready. Yes, each individual had a personal reason for wanting to take the course, however, they were all a little apprehensive about the unknown and how to actually learn online. As expected, the teachable moment surfaced and the course facilitators took advantage of it. We announced and reinforced our belief during the orientation and throughout the duration of the course that each student possessed the potential to succeed and we, as facilitators, would be right there with them along the entire journey.

The Need for More Change

Fourteen of original sixteen students weathered the storm and emerged as survivors. That is not to say that the two who dropped were not success material. One student dropped within the first two weeks and admitted that he was not yet disciplined enough to participate in an online course. The other student who dropped just before the course midpoint, true to the research, had outside obligations that required so much of his time than he could not devote the time or energy to complete the course at the level he felt was indicative of a graduate student.

The course was not an easy one as the students attested to in the formal Small Group Instructional Diagnosis (SGID) and the formal end of the semester evaluation. But they all agree that they were challenged and had acquired and used more skills (both hard and soft) than they ever anticipated. Many innovative teaching strategies had been implemented to keep them focused and motivated. It was very difficult for the course facilitators to step back and give the students some element of control over their learning. The process of student learning without boundaries was a phenomenon we had never experienced before and may actually be a process to which more faculty may need to adjust.

The evidence of the extent to which students learned exists in the form of the reflective letters each student wrote to an important person in their life. Coding and analysis of the data have provided us with the essence of what worked well, what did not, and what still needs to be done to facilitate learning in an

online environment. The students and course facilitators agreed that the mandatory, one-time only, on-campus "Guide to Success" orientation was one of the most beneficial elements of the course. Although not perceived as an initial problem, all the students were local residents of the university community. Coming on campus was easy and required very little time investment. Unfortunately, as the course was being marketed for Summer 2001, a number of potential students were at such a distance (including out of the country) that coming on-campus for a face-to-face meeting was cost prohibitive. Although we pondered numerous options, our best alternative was to move the orientation online to the WWW. But how could we retain the personal touch we had strived so hard to provide?

## A Reflective Vision

Change is never easy. The process, two years in the making, had merit – enough merit to find a solution. The research suggests that one of the problems with learning online via the WWW is that students feel isolated. The mandatory, one-time only, on-campus meeting added a much needed personal touch to the distance learning experience. Transitioning it to an online format was a challenge, but one well worth the risk. This abbreviated paper provides conference participants with an understanding of the journey thus far. The presentation will provide them with copies of the original "Guide to Success" materials and a preview of the new, interactive, Web-based "Guide to Success." Decide for yourself and then listen to the comments from students who participated in the on-campus orientation and subsequently previewed the online version. Emerging technologies do indeed make possibilities for change a reality.

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# LEARNING COMMUNITIES, ON-LINE WORK, AND DIVERSITY ISSUES IN A SMALL RESIDENTIAL COLLEGE

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While striving to create inclusive classrooms, educators have documented instructor characteristics, communication styles, and other factors that intefere with participation by diverse students (e..g, Howard & Henney, 1998). Technology-mediated instruction is subject to these same coercive factors: Students use more words in on-line chats when instructors decrease word use (Rickly, 1999); Women may receive more on-line feedback by using male pseudonyms (Pagnucci & Mauriello, 1999); And women are more likely than men to drop out of on-line discussions when their comments are opposed (Wolfe, 1999).

These biases may be exacerbated by technology that limited the time that students had for communicating. If so, asynchronous discussion boards should improve gender equity in participation by reducing competition for attention. In support of this, Graessle (2000) found that mixed-gender, asynchronous discussions in social science classes produced none of these gender biases. In fact, women in that study used more words in forum postings on the average than men and participated in discussions as frequently as men.

We undertook this study 1) to replicate these findings with another group of students and 2) to contribute to the fewer studies investigating.differences in on-line participation by ethnicity/race.

## METHOD

Seven asynchronous discussion boards in two social science courses were used. The two courses were selected because they required on-line discussion, enrolled both men and women, and enrolled a significant percentage of African-American and Hispanic/Latinoa (AA/HL) students, as self-identified on official college records.

Two discussion forums occurred in a course offered in a learning community format, involving students and faculty from two different major areas, and five forums occurred in an introductory psychology course. Students in each class were required to participate in on-line work, including the discussion forums used in this study. All students and faculty had access to three computer labs with T1 internet access. Instructors provided trigger questions to start a discussion that would occur over a period of several weeks. All forum postings recorded the name of the participant, the time and date of the posting, and the message, if any, being replied to.

*Measures*

Participation was measured by frequency of posting and number of words used. A content analysis was performed on all postings in four of the discussion forums by evaluating all postings and placing them into one of three categories reflecting different levels of quality of cognitive engagement:

*Academic postings* referred to materials outside the student's personal experience. These integrated theory with observation and resulted in an analysis of the discussion topic that exceeded personal experience. Academic postings addressed the original topic of discussion as well as other student's comments when relevant to the original topic.

*Anecdotal postings* emphasized the student's personal experiences, observations, or perceptions. They were usually posted in a first person mode, responding to the question at issue by comparison and contrast rather than by analysis. Anecdotal comments usually related most directly to the immediately preceding posting. While often staying on topic, they were just as likely to begin a different discussion path.

*Check-ins* were short, one or two-line comments that almost always expressed agreement with the immediately preceding posting and little else. These postings related to the topic in the preceding post, regardless whether that posting addressed the original topic.

## RESULTS

Quantitative analyses were restricted to the larger introductory psychology class. Student participation was measured by the mean number of entries or postings per student and by the mean total number of words per entry for men, women, whites, and AA/HL students for each discussion forum. Gender and ethnicity were treated as independent variables in 2 X 2 ANOVAs performed on the participation data.

*Mean Number of Entries per Student*

There was a simple effect of ethnicity, with white students posting entries significantly more frequently than AA/HL students ($F = 7.68$, df = 1/16, $p<.025$). Consistent with previous findings, there were no significant gender effects in mean number of entries per student. There is some evidence that faculty participation reduces the number of entries fro all students only when faculty do not participate at all.

*Mean Number of Words Used per Student Entry*

Consistent with previous findings, there was a simple effect of gender, with women using significantly more words per entry than men ($F = 7.68$, df=1/16, $p<.025$). There also was a statistically significant interaction between gender and ethnicity due to the greater number of words used in postings by white women compared to white men, AA/HL men, and AA/HL women ($F = 4.46$, df = 1/16, $p<.05$).

*Content of Discussion Boards*

The content analysis was performed on discussion boards relating to moral reasoning, "Difference is Good" (race/ethnicity) , drug use among children, and the psychology of hate. The majority of respones on all discussion boards were anecdotal. Moral reasoning had the largest number of check-in responses. This board had the most desultory discussion as well. The "Difference is good" forum also had large section of check-in responses around Thanksgiving break where students literally checked-in to say hi and wish the others well.

The other three discussion boards had lively and lengthy responses revolving about the issues. There were few check-in comments and responses were primarily anecdotal. Each board received one to three academic responses and any discussions that evolved from these comments were based in personal experience. There were no dueling theorists.

There were no differences by gender or ethnicity in the quality of responses.

## DISCUSSION

Our data replicates earlier research demonstrating that asynchronous discussion forums can provide discussion environments that are friendly to women (Graessle, 2000). However,

our results suggest that the facilitation of womens' participation found in the earlier study may not extend to AA/HL women.

We believe the gender-friendliness of asynchronous discussions results from the fact that, unlike traditional classrooms or live chats, students do not compete for time. Thus, competitive argumentative strategies--such as wearing down competitors with words, interrupting others, or shifting the topic of conversation--are less effective.

It is important to note that while the frequency of faculty participation had no impact on the gender and ethnicity differences in participation in this study, the nature of faculty feedback could certainly negatively affect students' entry into a discussion. The ability of faculty non-participation to reduce overall student participation in this study may simply be due to students' perception that a particular discussion is not important.

Our preliminary results indicate that issues of gender did not have much effect on the quality of the response to the discussion. The actual topic itself seems to be the driving force behind the quality of the response. The learning community format also did not seem to produce differences in quality or participation by gender or ethnicity.

The conditions that promote equity in ethnic participation are harder to identify, but it is clear in our data that on-line discussion forums produce more – but not higher quality – responses from white/Caucasian students than AA/HL students. Two implications we are exploring are: 1) Because whites outnumbeed AA/HL students, the lower participation rates may reflect conflict-avoidance or less security in these discussion topics. This might be consistent, too, with the large number of "I agree" and check-in comments we observed. 2) Although author gender and ethnicity does not predict the total replies received from others, it is possible that certain types of respodents – such as faculty or groups of students – may influence student participation.

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# e-Consultant: Development of Web-based Interactive Databases for IP Based Instructional Tools

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## Introduction

As the trend of shifting traditional classroom-based instruction to a web-based learning and teaching environment keeps growing rapidly, many IP based instructional tools are developed to satisfy the needs of implementing on-line instructional activities for the purpose of enhancing learning process. Educators and instructors are applying many of them to communicate, instruct and interact with learners. Also learners are using these tools to interact with instructional content, instructors and their peers. Such IP based instructional tools include e-mails, electronic bulletin boards, chatting rooms and furthermore, audio and video conferencing, etc. Amazingly, there are so many packaged IP based instructional tools to choose from and it is becoming a time-consuming process to select appropriate IP based instructional tools for instructional application. Sometimes due to the lack of background knowledge, selected instructional tools are not even applicable for certain online instructional implementation. In order to help intended educators and instructors to evaluate and select appropriate IP based instructional tools for their online instruction, we are developing a Web-based interactive database to facilitate the process of selecting and evaluating appropriate IP based instructional tools, and showing them the best ways to use it in their instructional settings.

Basically, there are two parts in this database. One is to perform searches for users according to information they provide, such as their budgets, intended application, available technical support, etc. Users will need to fill out a step-by-step web-based questionnaire to provide necessary information in order to allow database to perform searches and narrow down the results to the best fit for the instructional needs. The other part of this project is to provide relevant background knowledge as far as how to evaluate, select and implement IP based instructional tools into virtual classrooms. We also are trying to collect certain product reviews from users who have relevant experiences of using certain IP based instructional tools. Following users can refer to those reviews before they decide which one to use. The collection of product information will be conducted mainly on Internet, and then each item will be inputted into our databases manually on the World Wide Web for further searches.

Proceeding sections discuss briefly about how we design and develop this project. Firstly is the development of database and ASP pages. The second part is the instructional perspective of this project.

## Databases and ASP

Developing the technical part of this project is a very important step to insure that the user get what is required to be able to make the right choices in choosing the right software and hardware to start their online courses. The process of developing the technical part of this project is split into two sections. The reasons behind this, are that: First, updating the Databases should be as easy as possible. Secondly, the navigation, searching, and getting the results that helps him/her start their online instruction or enhance their online courses.

The first part of developing the e-Consultant for IP based instructional tools, is developing databases to store all the data related to all the products to online teaching and instruction. The databases are all related to each other and all focused on the products and their uses in various instructional settings. The databases are designed in Microsoft Access and the relations are all defined within the same program using the Structured Query Language (SQL). The reason behind using Access, is that it is used easy to use, update and is used by many people who might work on the project in the future to keep it improved and up to date.

The second part of the technical part is to link the databases to the World Wide Web (WWW) to make it accessible to all the intended audience. Active Serve Pages (ASP) will be developed to have dynamic content out of the databases and display it for the users. Using Visual Basic, Java, and JavaScript languages, the databases will be linked to the ASPs. This is the most delicate part in the development process since it will guide the users into a set of questions to be able to identify their instructional needs, and after that, it searches for the best matches and show them how to implement them and what is the cost associated with each solution along with suggestions and feedback from previous users. In other words, it involves certain amount of built-in intelligence and a lot of organization to optimize the results. We chose ASP because of its compatibility with Microsoft Access, and because it is easy to use.

The technical part of this project is responsible of making a user-friendly Website that enables the audience to get the right information for the right educational settings. There are thousands of products found in the markets, and tens of thousands of different combinations that can be done to put together an online instruction. And since Web-based instruction is in demand and is in great pace, it is a very frustrating process to choose the right equipment, and software to use especially when it is associated with big sums of money and time. The aim of our project is to broaden the perspectives for educators and instructors to develop and make the best use of the available technologies without previous knowledge. Furthermore, the aim of the technical par is to provide adequate information to the user and easiness of updating for the administrator. Since the technologies are developing so fast, we have to make it as easy as possible to update the databases or else it will become obsolete in a short period of time.

## Instructional purposes for individuals

As mentioned earlier, another purpose of this project is to provide relevant background knowledge to users who are interested in learning more about available IP based instructional tools. We are trying to develop an instructional website which is integrated with the databases. Users can search the explanation of particular term through the glossary section, for example. Also the instructional website can provide guidelines for users who intend to implement certain instructional tools into their online instructional environments. For instance, if instructors intend to use IP based video conferencing tools for their instructions, they might need to be informed regarding which IP based video conferencing tool will be appropriate for a class size of 30 students, etc. The design of this instructional website will allow users to go through all information step by step, also users can skip certain part of instruction based on their decisions. Another important aspect included in this part of project is the integration of product review, in which users can post their experiences about using certain IP-based instructional tools and how they implement technologies effectively and efficiently into their online instructional settings.

## Conclusion

In brief, both parts of the project compliments each other to better serve the user to learn about, search for, and implement the latest IP based instructional technologies in our time. The ease of its navigation, the up to date information it offers, and the intelligent searches it performs will be our goals to better serve instructors and educators to establish online instructional setting thereby enhancing effectiveness and efficiency of online learning.

**Veterinary Technology Distance Learning: Decision, Barriers, and Conversion: Is online learning suitable for your course?**

I. Introduction

II. Initial decisions
- a. Demand for course
  - i. Estimated numbers
  - ii. Audience
    1. Identification
    2. Size
- b. Cost
  - i. Content expert
  - ii. Instructional designer
  - iii. Computer expert
- c. Timeline
  - i. Development
  - ii. Courses on-line
  - iii. Completion date
- d. Software
  - i. Webct
  - ii. Html
  - iii. Others

e. Hardware
    i. Server

    ii. Student requirements

f. Faculty buy-in

III. Identify barriers
a. Cost
    i. More expensive than you think

b. Identifying correct staff

c. Legitimacy of course (program)
    i. Faculty

    ii. Audience
d. Resistance to change

e. Intellectual property

IV. Conversion Process
a. Course material

b. Textbook

c. Objectives

d. Supplemental materials
    i. Decision
        1. Handouts

        2. Video

        3. Pictures

V. Evaluation
a. Challenges
    i. Honest, constructive feedback

    ii. Formative feedback
        1. bulletin board

        2. e-mail
            a. questions

            b. complaints

b. Materials

c. Students

d. Peer

VI. Conclusion

VII. Questions

**Online Education Does Not Have To Mean A Lonely Learner**

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**Indiana Wesleyan University**

## Introduction

Education via the Internet can sometimes lead to a feeling of isolation in individual learners. However, it doesn't have to. In fact, it shouldn't. There are three categories of learning interactions in a distance education course: learner-content, learner-instructor, and learner-learner, all are important to learning (Moore and Kearsley, 1996). Interpersonal interaction includes both learner-instructor and learner-learner and is the subject of this paper. This paper investigates the importance of interpersonal interaction and humanizing of the online learning experience. It explains ways to design interaction into an online course and proposes other techniques to enhance interaction in online courses.

Interpersonal interaction can be accomplished using real-time communication (synchronous) or asynchronous communication with interaction independent of time and place. Interaction **uses** the computer but is not **with** the computer. A high level of interpersonal interaction is achievable in an online course. In fact, a good instructor can achieve more interpersonal interaction in an online course than a traditional face-to-face course. Interaction by the instructor can also create motivation and enthusiasm for the subject matter, just like in face-to-face courses, and is just as important. Many online courses concentrate primarily on causing learners to interact with content; there is little interaction with the instructor and none with other learners.

## Why Interpersonal Interaction is Important

Numerous studies have concluded that higher levels of interpersonal interaction in educational setting is associated with active learning, increased motivation, more positive attitudes toward learning, higher satisfaction with instruction, confidence in their learning capabilities, critical thinking and problem solving skills, deeper and more meaningful learning, and higher achievement (Flottemesch, 2000).

Interpersonal interaction fosters development of critical thinking through clarification of ideas and evaluation of others' ideas. The process of revising, discussing, and debating leads to deeper cognitive processing of course material. Discussions force students to think through the issue being discussed. It is through the actual process of writing our thoughts and working them over that we really come to understand an issue. Written thought also allows us to later review and reflect on our understanding. We also understand material better by bouncing our thoughts off others. We need reinforcement that our understanding is the same as others. When it comes to attitudinal changes, it is especially useful to bounce our thinking off other learners in addition to the faculty member who may have biases about course content.

Generally, online classes promote participation in discussions. Because of the delay in asynchronous discussions, students have time to reflect on or further research a topic before responding. Learners have control of the time of interaction, the number of interactions, and time taken to reflect on an issue before contributing to a discussion. Anonymity of contributors is a great equalizer; participants don't need to struggle for a turn to speak. The overall result is that slow thinkers and shy individuals are more likely to contribute than in a traditional classroom.

Without interpersonal interaction, distance learning students can become autonomous and isolated, procrastinate, and eventually drop out. With plenty of interaction, online students can truly connect with other students and their instructor. This connection leads to positive pressure to finish the course, work a little harder, and learn from each other rather than only from the instructor.

One of the major roles of an online instructor is "social" (Berge, 1995; Mason, 1991; Moore & Kearsley, 1996). Berge (1995) provides an explanation of the social role:

> Creating a friendly, social environment in which learning is promoted is also essential for successful moderating. This suggests "promoting human relationships, developing group cohesiveness, maintaining the group as a unit, and in other ways helping members to work together in a mutual cause," are all critical to success of any conferencing activities.

The instructor's job is to create a warm, welcoming environment that will entice students to begin participating immediately and to reassure them by providing clear directions and support structures. According to Mason (1991),

"nurturing skills are the essence of the feeling of community, which is such an important and yet surprising aspect of computer conferencing."

Rheingold (1993) says that the Internet is a place where "People often end up revealing themselves far more intimately than they would be inclined to do without the intermediation of screens and pseudonyms." Indiana Wesleyan University faculty taking the online orientation course confirm this, frequently saying there was a level of closeness never dreamed. New online faculty take this three-week online orientation course that prepares them to "teach" online as they realistically experience being an online student.

### Design for Interpersonal Interaction

Interaction must be planned or it is unlikely to occur, or if it does occur to be meaningful. Here are some ways to design interaction into an online course:

- **Discussion Forums.** Carefully integrate discussion questions throughout the course that contribute to the course learning objectives and are open-ended enough to achieve discussion instead of just responses to the instructor's questions.
- **Participation.** Require students to engage in discussion/debate and collaborate on projects, either synchronously or asynchronously. The online syllabus should be particularly clear and detailed about participation expectations, addressing both contribution quality and quantity, and requiring responses to other participants not just to the instructor. Students need to respond to questions posed by their instructor, but students should be minds sharpening other minds just like iron sharpens iron. Grading criteria should include assigning significant participation points (15-30 percent of total course points is normal depending upon the subject) and tying participation to attendance to encourage contributions.
- **Virtual Community Forums.** Include a Break or Café forum for important discussions that do not necessarily have anything to do with the course subject matter. Design some sharing questions into the course to get to know each other. Have students post their autobiography.
- **Workload.** Keep workload to a reasonable amount. If students must spend most of their available time accomplishing other assignments, they will spend little time on discussions.
- **Faculty Information.** Include information about faculty member: his or her academic and experience credentials, insights into his or her personality (family, interests, background, etc.), and a photograph. For Indiana Wesleyan University students, this information is available via the "Prof" button. Audio and video clips of the instructor may also be made available.
- **Class Size.** Keep classes small. Large classes will create an overwhelming number of postings to read (consider 50 students each posting three to six times per week), and students will usually not want to share much of themselves in a large class.
- **Due Dates.** Some students think that online courses are self-paced. Due dates for discussions as well as for assignments ensure students participate regularly.

### Other Techniques to Enhance Interpersonal Interaction

Here are some ways Indiana Wesleyan University requires online faculty to humanize the online learning experience:

- Ensure students treat each other respectfully (i.e., use good "netiquette"). Do not allow inappropriate discussions to continue.
- Log into the computer conferencing software at least five days a week and read every posting.
- Respond quickly to a student's comments or questions directed specifically to them. (Within 24 hours is best; 48 hours at the latest.) Quick response may alleviate uncertainty of not having face-to-face contact. Instructors who will be unable to log in for a couple of days should let students know so they do not become anxious.
- Provide frequent feedback to students, including providing grades in a timely manner. Online students desire and need frequent feedback from their instructor. This was the number one feedback by students enrolled in Indiana Wesleyan University's MBA Online program and is consistent with Hitlz (1994). Students become uneasy if the instructor does not respond to their communications in a reasonable time. (The university will need to define "reasonable.") The instructor cannot provide too much feedback to students in an online class.
- Participate in and guide discussions. Ask questions; correct error; redirect if discussions go off track and are unproductive; and summarize what was good, what was missed, and what might need clarification.

Sometimes the instructor should become one of the participants—modeling participation (Bischoff, 2000). Helpful hints for guiding computer-mediated discussions and keeping them on track are available (Rohfeld and Hiemstra, 1995; Hiltz, 1994; Mason, 1991).

Here are some other practical ways instructors can enhance interaction in an online course:

- Send a personal, welcoming message to each student.
- Send a personal message periodically to each student. Keep track so you do not leave anyone out.
- Respond to students' biographical information and identify points of connection or common interests (schools, hobbies, family, etc.).
- Share funny stories and jokes about **yourself**. However, cautiously use humor or sarcasm. It may be wise not to use humor or sarcasm due to different cultural and ethnic backgrounds that may be represented. It is especially difficult to construe intent and tone from on-screen text unless you know the students very well.
- Hold office hours in an online synchronous chat room or via toll-free telephone.
- Encourage those who are fearful of the technology. Do not take their fear too lightly.
- Continually let students know that they may contact you if they have questions.
- Call each student on the telephone.
- Ask questions rather than make statements.
- Thank and compliment students on their input. Be gently accepting of students' comments. Make them feel they have contributed to everyone's learning.
- Provide sharing questions. Make these fun questions just to get to know each other, such as "describe your best vacation" or "what was the best advice you ever received?"
- Don't be an authoritarian. Be the guide on the side. The instructor should also be a learner.
- Use students' names and sign your messages (i.e., include your name at the end).
- Use word tone and writing voice that communicate openness and feeling. Incorporate warmth by writing like you talk; letting more of your emotions/feelings/personality show; writing about family and interests; and describing the setting from which you are writing, the weather, or music to which you are listening. Of the following replies, which would you prefer?
  - Good answer.
  - Sally, Yes, yes, you've got it!! Hank

## Summary

Interpersonal interaction in an online class contributes to learning. Faculty skill and caring are the biggest keys to promoting this interaction. Faculty should encourage participation and create a friendly, comfortable social environment to help participants open up. It is a common misconception that online education is fairly sterile and impersonal. Incorporating the suggestions contained in this paper should result in a real feeling of community among online students.

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# Professional Storytelling Online

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Writing, reading and interpreting narratives offers an excellent venue to explore the knowledge embedded in actual nursing practice. Benner has used narratives for just this purpose. Others have used stories from nurses to uncover nurses' shared practices and common experiences.[1] Thus, narratives are recognized as legitimate ways of disclosing knowledge and understanding practice. The telling of stories can also help build relationships among the tellers and listeners and assist in personal growth and communication skills. They provide the audience with a glimpse of the world of the client, family members, and others as perceived by the student. Stories uncover client concerns, how to communicate with others, and how to reflect upon ethical issues while articulating what has been learned.[1] The story as narrative gives students an understanding of the values, beliefs and theory embedded in real-life situations. Benner states that the story demonstrates reasoning in transition while communicating intention, meanings and concerns.[1] The narrative creates a community of dialogue and memory that reveals everyday clinical knowledge. The story sets up memories for the audience that are more memorable than facts and data. The listener identifies with the storyteller and has an emotional response. Storytelling allows for pooled expertise and multiple perspectives. They enable the learner to share, validate and shape their world view. Although this article will focus on a nursing class, the actual process can be utilized with any profession where theory needs to be applied to real life practices.

Stories have been used in the curriculum in a small Midwestern university to assist in the education of BSN nursing students. Initially students told their stories during a face-to-face classroom session called "Professional Reflections" which was a part of their clinical experience in the second semester of their nursing program. Each student was scheduled for a specific time period to tell his/her story, after the faculty members had modeled this assignment over a two week period by telling their "stories." Students and faculty then responded orally to the stories. It was noted that in the classroom, many of the responses were more emotive and a "gut-reaction" to the story rather than thoughtful application of knowledge. Regrettably, if a student missed a week and didn't hear some of the stories, they were left out. The experience couldn't be recreated.

To overcome the limitations of the traditional classroom, the assignment was reconceptualized as an on-line assignment in a hybrid class. In a hybrid class, some assignments are on-line, while others are still in the traditional environment of the classroom. As Seminoff recommends, to accomplish this assignment took a partnership between the faculty and computer services.[2] For the faculty, this meant rethinking the assignment and outcomes desired and learning new technology. The person in computer services found free user-friendly software that the faculty could use to produce and play their stories on-line. We learned to record stories using a computer camera and microphone and then to transfer this recording to a program where all students could watch and listen to the story from any computer with internet capabilities. Faculty had to get new

computers that were faster and could accommodate the new cameras with reasonable speed of performance. Discussion forums were then set up so students could share their reactions/thoughts/ideas with the other students in the class. Then they were given the following instruction:

This is the place (in Blackboard) where you will view and hear your classmate's stories from practicum. For each story, please go to the specific discussion board and make one original response to the storyteller. Then make a second response to one of your classmates' responses. In other words, you will add at least 2 comments to each story. Comments should illustrate application of classroom theory and knowledge, share your feelings, agree/disagree with another, etc. If you are the storyteller, make sure you respond to your peers questions and comment further as needed. You can also share "the rest of the story."

The stories were left on-line for a period of about 2 weeks so students could respond at their leisure. They could log on any time of the day to watch the story and read the comments in the discussion forum. Students also had to have written instructions made so they could set-up their computers at home, or work, to play the stories. Once again, computer services found free software to accomplish this and students had a minimum of trouble preparing their computers, even though some programs had download times of 1-2 hours the students knew this was only a one-time nuisance and had few complaints. All of this preparation took many hours longer for the faculty than it would have to just tell the stories in the traditional classroom setting. A conservative estimate would probably be an extra 80 hours to rewrite the syllabus, have numerous meetings with computer services, test software in offices and the student computer lab, and write protocols.

The benefits of converting this assignment into an on-line assignment were many. Students appreciated the flexibility offered them in listening and responding to stories. Many students reported watching stories on a weekend or in the middle of the night, since these times fit into their schedules best. Students liked the fact that they got to know each other better through the stories and responses. Faculty were delighted that responses to the stories demonstrated strong application of classroom theory without compromising affective responses.

As a result of this project, faculty will never go back to the in-class, oral story presentation. Students and faculty alike both saw great benefit from converting this assignment to a new format. It meets the needs of the adult learner without compromising quality.

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# Supporting Group Problem-Solving Online: An Exploratory Study of Computer-Mediated Collaboration

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**Abstract**

A human tutor in a collaborative learning environment may help sustain group focus and momentum as well as provide necessary guidance. Yet, it is not clear what type of role this person should play or what types of pedagogical strategies he or she should assume, if any. In designing support for group learning, we compare online collaboration in different conditions in our collaborative learning environment as participants create algebraic models to solve word problems. The goal of this research is to understand computer-mediated collaboration in order to determine how a human can best support electronic learning. We identify appropriate instructional techniques for a supportive collaborator by examining the interaction and strategies employed by a peer-tutor and teacher and between peers working in our collaborative learning environment.

## Introduction

Collaborative learning has proven itself a successful and potentially powerful learning method. Proponents of collaborative learning claim that students in cooperative teams achieve higher levels of thought and retain information longer than students who work quietly as individuals (Wood, Nemer, Chizhik, & Sugrue, 1998). Students learning effectively in groups encourage each other to ask questions, articulate their thoughts, explain and justify their opinions, and elaborate and reflect upon their knowledge. Yet, the field of CSCL (Computer-Supported Collaborative Learning) continues to struggle to identify how best to support collaborative learning online. We report on a study that compares peer-mediated instruction and teacher-mediated instruction to identify the most effective methods of supporting learning in an electronic environment. In this study, we investigated collaboration in a system named Algebra Jam (Singley, Fairweather, & Swerling, 1999) and examined the interaction that occurred in various group manipulations.

## Collaboration in AlgebraJam

Algebra Jam is a collaborative learning environment that supports teams of students as they collaborate synchronously and remotely to solve situated, multi-step problems involving algebraic modeling, or modeling of the relationships between different variables. Students are provided with resources containing information they need to solve an algebra word problem and given various tools to support collaboration.

The blackboard (shown in the top right of Figure 1) supports the participants as they create a "goal tree", share ideas about how to attack a problem, and monitor team progress. They can post the variables they need to compute as nodes in the goal tree. The top of the tree contains the final goal. To aid in collaboration, a face of the user(s) with whom a student is collaborating is displayed in a panel to the right of the blackboard.

The tabbed workspace (shown in the lower right of Figure 1) is an area where students work with the various information resources required to solve the problem. The resources are dragged from the bookshelf (shown in the upper left of Figure 1). Like the blackboard, when one participant performs an action in the tabbed workspace area, that action is reflected synchronously to all other participants. This is intended to encourage collaboration in that students can work together to write equations, perform calculations, model solutions, and evaluate each other's work.

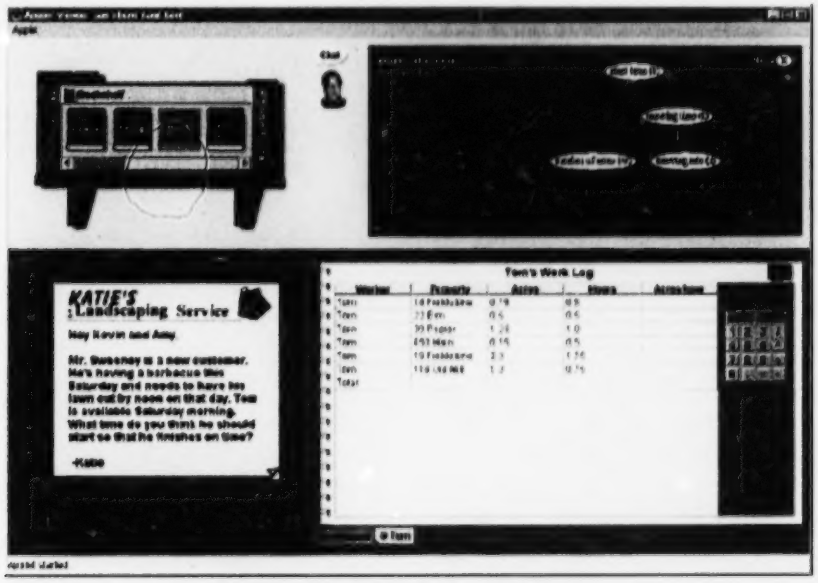
KATIE'S
Landscaping Service
Hey Kevin and Amy,
Mr. Sweeney is a new customer.
He's having a barbecue this
Saturday and needs to have his
lawn cut by noon on that day. You
is available Saturday morning.
What time do you think he should
start so that he finishes on time?
-Katie
Tom's Work Log

**Figure 1: Algebra Jam interface**

Rather than provide a generic chat facility, Algebra Jam allows learners to participate in threaded discussions tied spatially to the work products and interface objects with which they were working. Learners communicate with one another by typing a message while pointing to a particular object on the screen. They click on "Chat" above the face of other participants and a balloon opens in which they type. Users can place the chat balloon anywhere on the screen to focus their conversation or chat about a particular action or object. To further support collaboration, users must identify the type of comment they are contributing.

**Design of Study**

High school students from summer school programs in the metropolitan New York area and one high-school math teacher were placed in one of 4 groups:

- "Expert Tutoring" -- one student working with a teacher
- "Peer Collaboration" -- two students working together without role assignment
- "Collaboration Plus" -- two students working with a teacher
- "Peer Tutoring" -- two students working together in which one played the role of a tutor; the peer tutor had participated in "Peer Collaboration" as a (non-tutor) student

All participants were placed in separate rooms while they used AlgebraJam together. Chats were recorded and participants' actions and decisions coded to identify

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general strategies and techniques employed by peer tutors and teachers when students encountered difficulties.

**Findings and Discussion**

Figure 2 categorizes the percentage of interventions by both a teacher and a peer-tutor according to the instructional strategies they employed. We did not code the "Peer Collaboration" condition because the students worked independently and did not mediate each other's learning.

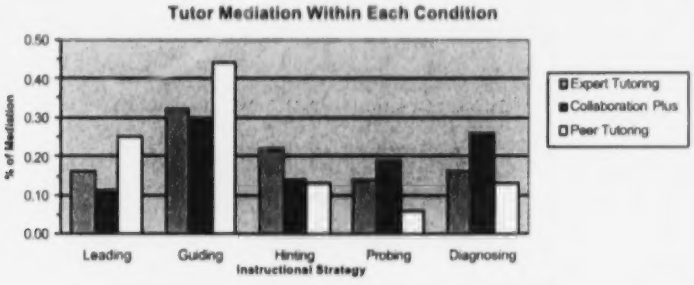


**Figure 2: Instructional strategies graph**

- In "Expert Tutoring", we saw that the teacher initiated more of the interaction when the student was struggling. The teacher used the *guiding* strategy most frequently.
- We had expected that students in "Peer Collaboration" would work as equals, but without a more expert participant, they proceeded as individual problem-solvers.
- In "Collaboration Plus", when students did interact, they often misdirected each other or moved off-task, requiring teacher intervention. The teacher used mainly *guiding*, followed closely by *diagnosing*.
- Peer tutors were approached in a similar manner to a teacher. They used more straightforward instructional methods such as *guiding* and *leading* to help a student.

These findings suggest the primary job of an electronic collaborator might be improving communication and mediating interaction to keep students on-task and facilitate problem solving. The social relationship and age similarity of students did not override the perceived knowledge differences as a motivator for interaction. Whether we choose a peer-mediated or teacher-mediated model of instruction, students will benefit from awareness that the electronic collaborator is more knowledgeable.

We found that support for group learning must include diagnosis of errors and redirection to the correct solution path. Human tutors in group settings must effectively collaborate, hint, guide, probe, and diagnose in a way that supports team problem-solving without actively leading the team towards a predetermined outcome.

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# A User Analysis for Web-based Distance Education

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**Abstract**: This study identified direct and indirect effects of Web users' age, gender, technical training, computer and Web competencies, perceived usefulness of the Web, and perceived needs of the Web on their Web use. A theoretical model for the variables that affect individual differences in Web use was conceptualized through related literature and research review in the areas of computer, on-line networking, and the World Wide Web. This study employed an ex post facto design to investigate factors that were related to Web use. Results revealed that there was a negative total effect of the age of participants on the amount of time spent using the Web. Also, their perceived needs of Web use, technical training they had received, perceived usefulness of the Web, and their computer and Web competencies had positive direct effects on their Web use. In particular, young participants spent more time using the Web and showed slightly more positive perception on the usefulness of the Web than more mature participants did. The results also showed that there were gender differences in the participants' computer and Web competencies, in which the male participants showed a higher level of competency in Web use. Overall, the findings of this study suggest that basic skills and knowledge of Web use should be provided formally or informally to learners in order to facilitate the Web use for participants of Web-based instruction. It is also recommended that communication channels be provided for participants of Web-based instruction in order to facilitate their Web use.

## Introduction

The World Wide Web has been increasing dramatically in its popularity and accessibility due to the explosion of activities occurring on the Internet. The rapid growth of the World Wide Web has changed the "fundamental way to create, manipulate, store, re trieve, transfer, and utilize information" (Bruce, 1998, p.541) and has offered colossal potential for many fields, from education and training to entertainment (Alexander, 1995; Khan, 1997).

In recent years, the World Wide Web has been described as an "information superhighway" (Bruce, 1998), and a "universal panacea for information searching" (Smith, Newman, & Arks, 1997). The Internet started from 213 hosts (any computer system connected to the Internet) in 1981, and by July of 2000 there were 93 million hosts, representing an increase of 426,824 times over the last two decades (Wizard, 2000). It is estimated that there are currently over 400 million users in the world(NUA Internet Survey, 2000).

In particular, as society has entered the information era, there are increasing societal needs for life-long learning (Daniel, 1998) and commercial portal Web sites that list online courses available through various colleges, universities, and other institutions are booming (Carr, 2000). Also, industries have been rapidly adopting the World Wide Web technology in training their employees (Training Magazine, 2000).

As the popularity of the World Wide Web increases, the tremendous potential of the World Wide Web for education and training has been suggested by many researchers (Anderson, 1997;

Crossman, 1997; Jonassen, 1986, 1988; Jonassen, 1989; Jonassen et al., 1997; Khan, 1997; Marchionini, 1988; Oliver & Oliver, 1996; Riddle, Nott, & Pearce, 1995). From the beginning, many researchers attempted to utilize the Web's capabilities for teaching and learning, and the World Wide Web has become ubiquitous in education not only for learning and teaching but also for library services and school administration (Crossman, 1997; Gabbard, 2000; Khan, 1997; Oliver & Oliver, 1996; Riddle et al., 1995; Soberberg, 2000).

However, as Davidson (1995) states "as educators, we would never consider gathering a collection of texts, audio-visuals, and other reference material and simply dropping them in a heap on a table, and expect our students to "learn" from them"; in other words, simply publishing an electronic course or information on the World Wide Web with links to other pages or other digital resources does not constitute instruction (Khan, 1997; Peraya, 1998). Rather, designing and delivering instruction on the Web requires thoughtful analysis and investigation on how users interact with the Web (Khan, 1997).

New technologies and media have been popular research areas to educators and researchers throughout the history of education. Even though technologies as delivery systems have been considered so crucial to effective learning and teaching, research on media and technology has been driven by practice, rather than influencing it. Research in this area has focused on media or technology comparison studies, descriptive studies, and evaluation reports. While media comparison studies may be useful for making media selection, in fact, they do not contribute much to understanding of technology as a delivery system in education (Clark, 1983; Herschback, 1984; McClelland & Saeed, 1986; Moore & Kearsley, 1997; Schrum, 1999). Therefore, the new focus of research in media and technology has shifted toward learner characteristics as these are believed to be more useful and appropriate factors related to learning (Dillon & Gabbard, 1998; Dillon & Watson; 1996; Moore & Kearsley, 1997; Russell, 1997; Schrum, 1999). For instance, after analyzing extensive experimental evidence in hypermedia, Dillon and Gabbard (1998) stated the learner characteristic as one of the most important areas for future research.

Also, in the field of instructional design, learner analysis, which follows the initial stage of identifying the need for instruction, is considered to be one of the most critical steps in the instructional design process. There are several factors that are crucial for pedagogical decisions in the instructional design process (Hajizainuddin, 1999), and these factors include learners' general characteristics, their specific entry behavior, and their learning styles (Heinich, 1996).

**Background**

Even though there is an ample amount of research on the factors that affect computer use, few studies have dealt with the use of the World Wide Web. However, previous studies provide a theoretical model for investigating the factors that influence the use of the World Wide Web.

Previous research on computer and new technology examined a variety of factors related to Web use, and gender is one of the most popular factors among them. However, there has been no clear consensus on the results of the studies. Previous studies found significant gender differences in computer learning and competency (Abler & Sedlacek, 1989; Feltler, 1985; Harrison & Rainer, 1992; Swanders & Jarret, 1986; Wilder, MacKie, & Cooper, 1985), attitude toward computer use (Chen, 1986; Collis, 1988; Comber, Colley, Hargreaves, & Dorn, 1997; Huges, MacLeod, Potts, & Rodgers, 1985; Koohang, 1989; Tamar Levin & Claire Gordon, 1989; Loyd & Gressard, 1986; Massoud, 1991; Miura, 1987; Richards, Johnson, & Johnson, 1986; Young, 2000), experiences in computer use, (Comber et al., 1997; Young, 2000), computer activity preference (Lockheed & Frakt, 1984), technostress (Elder, Gardner, & Ruth, 1987), and Web use (Teo & Lim, 2000), whereas there were findings that showed no significant difference between genders in terms of attitude toward computer (Koohang, 1989; Marshall & Bannon, 1986), the amount of computer use (Kay, 1990), and the ability of computer programming (Webb, 1985).

Recent research indeed shows that the number of women using the Internet has increased dramatically (Media Metrix, 1999; Nielsen Media Research, 1999; U.S. News & World Report, 1995). However, there is still a gender difference in the Web use (Teo & Lim, 2000), despite the tendency of increase in women's Web use.

One of the most important factors for users concerning the use of the Web is whether the Web site satisfies the user's need (Rogers & Shoemaker, 1971). While there have not been many empirical studies on users' perceived need of computers and their use of the Web, findings to date show that users' perceived need of technology has an influence on their adoption of new technology. For instance, a study by Marshall (1990) shows that the perceived need by users is a strong predictor of the adoption of new

technology, and Robinson (1995) states that unless users have specific needs for using new technology, they would not adopt it.

Many studies have verified the importance of technical support for new technology and Web-based learning. Jorde-Bloom and Ford (1988) posited that the high level of support for new technology had a positive impact on the individual's decision on its adoption. Technical support for hardware and software also has an effect on Web-based distance education (Hara, 1998) and technology integration (Hoffman, 1996; Roberts & Ferris, 1994b). In addition, failure to locate such supports and to control them appropriately can result in an inevitable fiasco. Mruk (1984) reported that support for learning to use computers had an influence on computer use in adult computer training.

Many studies have shown the importance of the impacts of users' experience and competency on their attitude toward computer use (Koohang, 1986, 1987, 1989; Koohang & Byrd, 1987; Tamar Levin & Claire Gordon, 1989; Loyd & Gressard, 1984), computer use in computer-based learning (Hall & Cooper, 1991; T. Levin & C. Gordon, 1989; Marcoulides, 1988; Martin & Lundstorm, 1988), computer use (Harold, 1992; Shawareb, 1993), perceived computer usefulness (Campbell & Williams, 1990), and Web-based instruction (Hajizainuddin, 1999; Hara, 1998).

Many researchers have studied on the effects of technical training and support that users receive, and their computer competency on their computer use. Yildirim (1997) reported that there was a significant correlation between the number of technical training users had received and their computer competencies. Computer competency and technical training were positively related to computer use in the classroom (Shawareb, 1993) and computer-based learning (Shin, Schaller, & Savenye, 1994). Meltzer and Sherman (1997) also posit that providing technical training and support are critical to the successful integration of technology for users. Marcoulides (1988) argues that the lack of knowledge in computer creates the anxiety on its use and increasing familiarity with computers is important for computer use. Roberts and Ferris (1994a) found that teachers' knowledge in computer is an important factor for them to integrate computers into their classrooms.

Based on the findings of previous studies on the use of computers and the Web, the purpose of this study is to investigate the relationships of such factors as users' age, gender, the amount of technology training they received, their perceived need and usefulness of the Web, and their computer competency to their Web use.

**Method**

Sample

The sample for this study was drawn from DACOM Chollian users. DACOM Chollian is a Korean networking company that provides online services and Internet PPP. Through log-on user searching, the sample was selected from the users who logged onto the Internet service from 5:00 p.m. to 9:00 p.m. on October 15 in 2000. The sample includes a wide range of backgrounds in terms of age, profession, and educational level. E-mail messages soliciting the permission to participate in the study were sent to 785 users and electronic questionnaire was sent by e-mail to 350 members who consented to participate in the study. As the result, 257 questionnaires were returned, yielding a response rate of 73.4%.

Instruments

The instruments of this study consist of two sections: demographic and factor measurements. The demographic section asked the participants' age, gender, profession, the amount of weekly use of the Web, the amount and the kinds of technical training they had received, and open-ended questions on their knowledge of computers and the Web. The later section consisted of the questions about their perceived needs of the Web use, their perceived usefulness of the Web, and their competencies in computer and Web use. The instrument to measure factors was modified from the survey created by Harold (1992). The question items regarding their perceived usefulness of the Web consisted of six question items, and there were also four question items regarding their perceived needs of Web use. The question items regarding computer and Web competency consisted of nine categories; word processing, database management, spreadsheets, presentation software, communication, Web browsing, desktop publishing, computer language, and game. Participants were asked to rate their competency on the questionnaire, and each item in the questionnaire used a five-point Likert scale.

The Causal Models and Data Analysis

A causal model that structures a theoretical ordering of variables in terms of their effects on other variables was developed through the review of relevant studies. Path analysis was used to analyze the causal models in order to differentiate between direct and indirect effects of selected variables on the use of the Web. Simultaneous regression equations were employed to assess the significance of the relationships. Pearson correlation analysis was used to analyze the strength of the relationship between each independent and dependent variables in the causal models. A comparison of the path coefficients examined the relative importance that the exogenous (age and gender) and endogenous variables (computer and web competency, perceived usefulness of the Web, perceived need of the Web, support) had on users' Web use.

**Results**

Table 1 shows the results of the path analysis for indirect and direct effects and Pearson correlation coefficients among the variables being studied. The path analysis model that was used to analyze the relationships among the variables is depicted in Figure 1. The total effects and Pearson correlation coefficients are also shown in this model. The major research interest in this study was in the magnitude of direct and indirect effects of the variables on the participants' use of the Web.

The result o f the first structural equation shows that age ($r = -.29$, $p < .01$), perceived need of the Web ($r = .48$, $p < .01$), perceived usefulness of the Web ($r = .29$, $p < .01$), computer competency ($r = .32$, $p < .01$), and technical training ($r = .29$, $p < .01$) have significant correlations with their Web use. The total effects on Web use were perceived need (.46), computer competency (.37), technical training (.31), and age (-.14). Age had only an indirect effect on Web use. The gender variable failed to achieve a significant path coefficient.

The result also shows that computer competency was negatively related to age ($r = -.29$, $p < .01$) and gender ($r = -.22$, $p < .05$). The total effects of age (-.28) and gender (-.26) also showed significant relationship at the .01 level. However, there was no significant correlation between computer competency use and perceived need of the Web. Perceived usefulness of the Web also failed to achieve a significant path coefficient.

The amount of technical training that the participants had received was correlated only with gender ($r = -.23$, $p < .01$) with a direct effect of -.19. The path analysis showed that the amount of technical trainings that the participants had received was not significantly correlated with their age, their perceived need and usefulness of the Web.

Age was also significantly correlated with the participants' perceived usefulness of the Web ($r = -.19$, $p < .05$) and their perceived need of Web use ($r = -.18$, $p < .05$). The direct effect of age on perceived usefulness of the Web was -.15, and its direct effect on the perceived usefulness of the Web was -.13. However, no significant relationship was found between gender and the perceived need of the Web and perceived usefulness of the Web.

**Discussion**

Findings reveal that there are important factors that influence the degree of Web use. However, not all factors have direct effects on Web use. Age was an important factor that had an effect on the participants' Web use and also on other variables. The total effects of age had a negative relationship on the amount of Web use, perceived need of the Web, perceived usefulness of the Web, and computer competency. In particular, younger participants were more likely to spend more time using the Web than older participants, and they were more likely to perceive the need of Web. The younger participants also rated themselves as having more computer competency.

Many researchers have reported similar results on the use of computers. Harold (1992) found significant difference between the age of professors of adult education and the amount of time spent on using computers. Mathews (2000) also found a significant difference between age of teachers in Idaho school districts and their use of the computer. Korgaonkar (1999) also found that younger Web users spent more time on the Web than older Web users for personal use. However, for business purposes, older Web users were more likely to make Web purchases.

Even though there was no significant difference between gender and the use of the Web, gender differences were found in computer competency and technical training. The result showed that the male participants rated themselves as having higher computer competency than female. Male participants were

also more likely to take technical training than female. This finding confirms the findings of previous research which reported the male dominance phenomenon in the computer related field (Herring, Johnson, & DiBenedetto, 1995) (Mathews, 2000).

The finding also showed that the participants' computer competency level has a positive impact on the amount of their Web use. This finding is consistent with the previous studies on the computer use by Dusick and Yildirim (2000), and Mathews (2000).

Participants' perception on the need of Web was a strong predictor of their Web use. The direct effect of their perception on the need of Web use was .46 at .001 level. The amount of technic al training the participants had received also influenced the amount of Web use (T.E = .31, $p < .001$). Dusick and Yildirim (2000)'s study on college faculty members also showed that their computer competency level was positively related to the amount of training courses that they had taken.

In sum, the study found out that the participants' perceived need of Web use and its usefulness, the amount of technical training they had received, their computer competency level, and age had significant effects on their Web use. However, gender did not influence their Web use significantly.

**Implications**

In order to facilitate the use of the Web, users need to perceive the potential of the Web use so that they could formulate a need and value of the Web use. Also, improvements in their computer and Web competency also should be made through technical training to encourage their effective Web use.

Participants responded that not only formal technical training sessions and workshops but also informal learning, such as learning from colleagues, friends, and the resources on the Web were helpful to learn and use the Web. Therefore, basic skills and knowledge for using the Web could be provided either formally or informally in order to facilitate the Web use for Web-based instruction. It is also suggested that communication channels between users or participants of a Web site is necessary in order to facilitate their Web use.

Online instructors have to play multiple roles, which are distinctive from traditional classroom instructor' roles; i.e. they have to provide learners with technical, social, and managerial support as well as pedagogical support (Ursery & Meacham, 2001). As the use of the Internet becomes more popular, and the need for life-long learning increases, the population of Web users will become more diverse with diverse. Therefore, online instructors should be aware of the individual differences in Web use, and provide the learners support for those who need remedial training for their Web competency.

Also, at the institutional level, the learner support system is needed to assess individual's need for remedial training on the Web use and also to provide the learner with the training that meets the individual's needs. In addition, comfort level with technology is an important barrier to faculty's participation in online teaching (Freberg, 1995; Garrison,1990; Schifter, 2000), and McIsaac and Gunawardena (1996) found out that lack of training opportunity for faculty affected their dissatisfaction with teaching distance courses. Therefore, institutions offering distributed education need to provide instructional and technical support for the faculty regarding their Web use.

Table 1. Decomposition of effects from the Path Analysis of the reduced mo del

| Effect | R | Causal Effect Direct | Indirect | Total |
|---|---|---|---|---|
| On Training | | | | |
| By Age | -.12 | -.09 | -.00 | -.09 |
| By Gender | -.23** | -.19* | .00 | -.19** |
| By Need | .17* | .07 | .03 | .10 |
| By Usefulness | .09 | .03 | .00 | .03 |
| On Usefulness | | | | |
| By Age | -.19* | -.15* | .00 | -.15* |
| By Gender | .09 | .03 | .00 | .03 |
| On Need | | | | |
| By Age | -.18* | -.13* | .00 | -.13* |
| By Gender | -.11 | -.04 | .00 | -.04 |
| On Computer competency | | | | |
| By Age | -.29** | -.19 | -.09 | -.28** |
| By Gender | -.22* | -.21* | -.05 | -.26** |
| By Need | .13 | .04 | .00 | .04 |
| By Usefulness | .08 | .03 | .00 | .03 |
| On Use | | | | |
| By Age | -.29** | .03 | -.17* | -.14* |
| By Gender | -.11 | .04 | -.09 | -.05 |
| By Need | .42** | .39** | .07 | .46** |
| By Training | .28** | .28** | .03 | .31** |
| By Usefulness | .29** | .24** | .00 | .24** |
| By Computer Competency | .32** | .26** | .11 | .37** |

* $p < .05$ ** $p < .01$

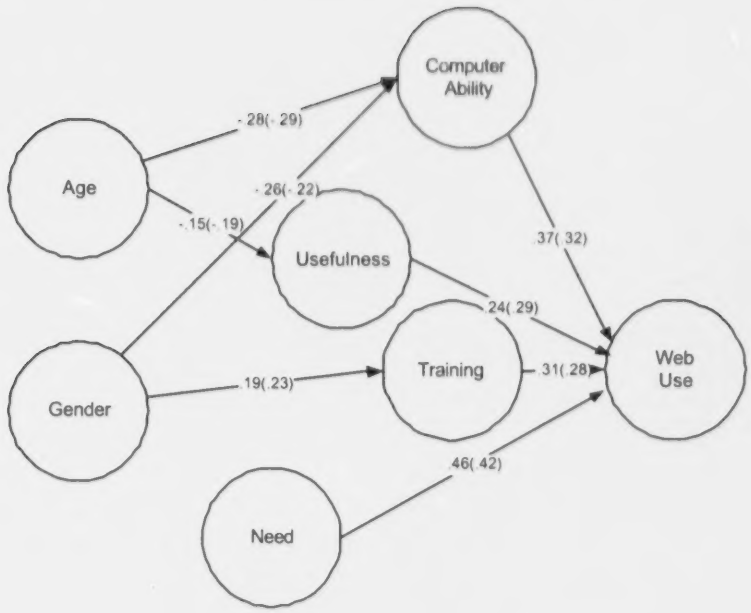


Figure 1. Path coefficients and Pearson r Coefficients for the Model

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## *The Effect of different Menu styles on the User's perception and performance on the WWW*

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**Abstract**

*As the Web becomes more popular, the interest in effective navigation is increasing. Menu design is becoming a central issue of human computer interface design as the focus of computer applications moves from the computer as a machine to the human as a user. The purpose of this study was to investigate the effect of three different Web menu designs: simple selection menu, global and local navigation aid menu, and pull-down menu, on the User's perception and information seeking performance. Three Cyber-shopping mall Web sites were developed for the experiment. These Web sites had the exact same content but each had a different menu design with a constant information structure. The result showed that overall information seeking performance was best in the pull-down menu. Participants performed better in searching with the pull-down menu but were faster in browsing with the global and local navigation aid menu. However, there was no significant difference between users' perception and three menu designs.*

**Introduction**

The popularity and accessibility of the Web has been increasing dramatically due to the explosion of activity occurring on the Internet. The Web changes the fundamental way to receive and transmit information (Wood, Brodlie, & Wright, 1996). However, navigating in the Web is often not an easy task, especially for novices (Berg, 1997; Collis, 1991; Conklin, 1987; Dieberger, 1997; Elm & Woods, 1985; Fiderio, 1988; Gray, 1993; Hammond, 1989; Jonassen & Grabinger, 1990; King, 1996; Marchionini, 1987; Sand, 1996). The potentially complex linking system and information structure awaiting Web users can cause disorientation (Conklin, 1987), increase cognitive load (Collis, 1991; Conklin, 1987) and finally lead to users getting lost in hyperspace (Hammond and Allinson, 1989; Neilsen, 1990).

Such problems have prompted research on the manner in which users interact with hypertext systems including the Web. Researchers have studied a variety of aspects of user interface for effective navigation and information seeking. Since the main purpose of a Web site is to access information and knowledge effectively, how the information is structured on the Web site and how the link mechanism is designed and presented on the menu of the Web site determines the success of the navigation effects (Berg, 1997; Halasz, 1988; Hardman, Bulterman, & Rossum, 1994; Shneiderman, 1998; Shneiderman & Kearsley, 1989).

Menu design provides a contextual or structural model for the logical and functional organization of the user interface component, as well as a means of communication between the users and the system (Lai & Waugh, 1994; Laverson, Norman, & Shneiderman, 1987; Norman & Chin, 1988; Oliveira, Goncalves, & Medeiros, 1999). Many researchers argue that menu systems should be designed to provide users with an efficient and effective organizational model for navigation (Dieberger, 1997; Jonassen, 1986; 1988; Jonassen, 1989; Marchionini, 1995; Schenkman & Jonsson, 2000; Shneiderman, Byrd, & Croft, 1997).

Although research in the field of menu design has been conducted to continuously improve navigation, it remains difficult to develop hypertext systems that can help users navigate without experiencing disorientation problems and cognitive overload, while also being able to find information effectively. Usable design guidelines and principles for the Web will maximize Web site coherence and will minimize users' cognitive overload, thereby allowing users to create an accurate mental model of the Web structure.

The main objective of this research was to investigate the effects of three popular menu designs models on the Web. The specific research interests were related to the speed of information seeking,

participants' degree of disorientation, and the degree of perceived appeal of three different menu design models by participants.

**Method**

Three Cyber-shopping mall Web sites were developed with three different menu designs and constant information structure (4 x 4 x 4 x 4) for this experiment. The navigation effect was measured by three factors: appeal, disorientation, and searching performance time for 15 searching tasks. The searching tasks involved two information seeking behaviors, 10 information searching tasks and 5 browsing tasks. The information searching behavior required that users find the information with more specific and analytic plan. The information browsing asked that users navigate the Web site with less specific information seeking object. 17 undergraduate and graduate students of a mid-western research oriented University participated in this study.

**Research Design**

The methodology used in this study was a one-way ANOVA with repeated measure experimental design. The experiment consisted of three sessions. In each session, the subject was randomly assigned to one of three menu designs. These three treatments were three Web sites that had same information but different navigation menu designs.

- menu design A: simple selection menu design
- menu design B: global and local navigation aid menu design
- menu design C: pull-down menu design

The dependent variables in this study were the speed of information seeking and attitude toward each menu design. Attitude variables were constructed to investigate participants' perception on the appeal of the different menu designs and the degree of the perceived of disorientation.

**Materials**

Three Web sites were developed for this study. Each Web site had the same contents but three different menu designs: simple selection menu, global and local navigation aid menu, and pull-down menu. The title of three Web sites was Cyber shopping mall and the information that they contained was shopping items and the prices of those items.

Figure 1. Three different menu designs, simple selection menu (left), global and local navigation aid menu (middle), and pop-up menu (right).

**Selection of Searching Task**

In order to measure the influence of different menu designs on the Web site, this study included two types of tasks: searching and browsing (Canter, Rvers, & Storrs, 1985). The merchandise items that are familiar to users were selected as the task domain. The first reason for selecting merchandise items is that the task domain should be easy enough to perform searching task without requiring any specific knowledge or skills, in order to control this variable from other factors because the user's prior knowledge of task domain can affect on the searching performance (Marchionini, 1995). Second, the shopping items can be effectively presented in the form of hypertext because they have a relatively clear relationship for



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categorization and can be easily structured in hierarchy. Third, shopping items have been used to examine the menu design and information structure because shopping is a common interest of people (Norman & Chin, 1988; Park & Kim, 2000).

Ten searching tasks and five browsing tasks were included in this study. The examples of each task were as follows:

- Searching task: You want to buy Epson Color 200 printer in this Web shopping mall. Please find the price of this printer in this site.

- Browsing task: Your father likes music very much and you want to buy a birthday gift for your father. Please select the music item that will make your father happy.

**Participants**

Total 21 undergraduate and graduate students participated at mid-western university in this study voluntarily. We excluded four subjects from final analysis because they missed at least one test session. Therefore, the actual number of subjects for the final analysis was 17. Subjects ranged in age from 24 to 36 years. They were diverse in terms of their computer and Internet related abilities.

**Procedures**

This experiment consisted of three sessions. During the first session, a participant was asked to fill out the background information form. It took approximately five minutes to fill out this form. After completing the questionnaire, a participant was randomly assigned to one of three treatments and was asked to find the answers of 15 tasks. The tasks were shuffled beforehand to ensure that the sequence of the tasks was random. Each task was given to the subject one at a time.

The subject was told to tell the researcher "start" before he/she started each searching task and to tell the researcher "the price of the item" after he/she found the answer. During information seeking tasks, the researcher measured the time for each task. This procedure continued until the subject finished all 15 tasks. It took approximately 20 to 25 minutes for a subject to finish all tasks. After completing the test session, the participant was asked to complete an attitude questionnaire. This took about 5 minutes.

One week was allowed to lapse between the first and second session to remove memory effect. On the second session, the subject was randomly assigned to one of the remaining two treatments. The procedure was the same.

Another week was allowed to lapse before the third session. On the third session, the subject was assigned to the last treatment. The procedure was the same.

## Results

Table 1 and Table 2 showed that there was significant difference in the total amount of time to complete information seeking performance among the three menu designs, $F(2, 50) = 7.09$, $p < .01$.

Table 1
Mean and Standard Deviation for Searching Performance Time by Menu Design

| Design | N | M | SD |
|---|---|---|---|
| A | 17 | 212.36 | 87.03 |
| B | 17 | 170.64 | 44.95 |
| C | 17 | 143.42 | 36.52 |

Table 2
Repeated Measures Analysis of Variance for Searching Performance Time

| Source | df | SS | MS | F |
|---|---|---|---|---|
| Design | 2 | 40991.55 | 20495.77 | 7.09** |
| Blocks (Subjects) | 16 | 82376.34 | 5148.52 | 1.78 |
| Residual | 32 | 92509.54 | 2890.92 | |
| Total | 50 | 215877.43 | | |

**$p < .01$.

Post-hoc contrast analysis results showed that there were significant differences between menu design A and B, $F(1, 50) = 5.12$, $p < .01$, and menu design A and C, $F(1, 50) = 13.97$, $p < .001$. However, there was no significant difference between menu design B and C, $F(1, 50) = 2.18$.

Table 3
Contrast Results for Searching Performance Time by Menu Design

| Contrast | df | SS | MS | F |
|---|---|---|---|---|
| Menu Design A vs. Menu Design B | 1 | 14793.08 | 14793.08 | 5.12** |
| Menu Design A vs. Menu Design C | 1 | 40396.08 | 40396.08 | 13.97*** |
| Menu Design B vs. Menu Design C | 1 | 6298.16 | 6298.16 | 2.18 |

**$p < .01$. ***$p < .001$.

As mentioned above, information seeking performance was divided into two task types: searching task and browsing. Repeated measure ANOVA results showed that the result of effect of searching task on time to spend finding answers among three menu designs (See Table 4 and 5). There was significant difference among the menu designs.

Table 4
Mean and Standard Deviation for Searching Task by Menu Design

| Design | N | M | SD |
|---|---|---|---|
| A | 17 | 137.46 | 68.85 |
| B | 17 | 116.70 | 37.15 |
| C | 17 | 86.33 | 23.54 |

Table 5
Repeated Measures Analysis of Variance for Searching Task

| Source | df | SS | MS | F |
|---|---|---|---|---|
| Design | 2 | 22483.02 | 11241.51 | 6.14** |
| Blocks (Subjects) | 16 | 48224.07 | 3014.00 | 1.65 |
| Residual | 32 | 58571.54 | 1830.36 | |
| Total | 50 | 129278.63 | | |

**$p < .01$.

Post-hoc contrast analysis results showed that there were significant differences between menu design A and C, $F(1, 50) = 12.14$, $p < .001$, and menu design B and C, $F(1, 50) = 4.28$, $p < .05$. However, there was no significant difference between menu design A and B, $F(1, 50) = 2.00$. In other words, based on Table 4 and 6, even though there was no statistically significant difference between Design A and B, the amount of the time of Design C ($M = 86.33$, $SD = 23.54$) is shorter than that of Design B ($M = 116.70$, $SD = 37.15$), that of Design B is shorter than that of Design A ($M = 137.46$, $SD = 68.85$).

Table 6
Contrast Results for Searching Task by Menu Design

| Contrast | df | SS | MS | F |
|---|---|---|---|---|
| Design A vs. Design B | 1 | 3663.31 | 3663.31 | 2.00 |
| Design A vs. Design C | 1 | 22221.35 | 22221.35 | 12.14** |
| Design B vs. Design C | 1 | 7839.86 | 7839.86 | 4.28* |

*$p < .05$. ***$p < .001$.

Table 7 and 8 showed that the result of effect of browsing task on time to spend finding answers among three menu designs. There was also significant difference among the menu designs.

Table 7
Mean and Standard Deviation for Browsing Task by Menu Design

| Design | N | M | SD |
|---|---|---|---|
| A | 17 | 74.90 | 27.87 |
| B | 17 | 53.94 | 16.12 |
| C | 17 | 57.09 | 16.30 |

Table 8
Repeated Measures Analysis of Variance for Browsing Task

| Source | df | SS | MS | F |
|---|---|---|---|---|
| Design | 2 | 4342.23 | 2171.11 | 6.71** |
| Blocks (Subjects) | 16 | 10480.37 | 655.02 | 2.02* |
| Residual | 32 | 10358.23 | 323.69 | |
| Total | 50 | 25180.82 | | |

*$p < .05$. **$p < .01$.

Post-hoc contrast analysis results showed that there were significant differences between menu design A and B, $F(1, 50) = 11.53$, $p < .01$, and menu design A and C, $F(1, 50) = 8.33$, $p < .01$. However, there was no significant difference between menu design B and C, $F(1, 50) = .26$. Although there was no statistically significant difference between Design B and C, the amount of the time of Design B ($M = 53.94$, $SD = 16.12$) was shorter than that of Design C ($M = 57.09$, $SD = 16.30$), that of Design C was shorter than that of Design A ($M = 74.90$, $SD = 27.87$).

Table 9
Contrast Results for Browsing Task Menu Design

| Contrast | df | SS | MS | F |
|---|---|---|---|---|
| Design A vs. Design B | 1 | 3733.40 | 3733.40 | 11.53** |
| Design A vs. Design C | 1 | 2695.63 | 2695.63 | 8.33** |
| Design B vs. Design C | 1 | 84.31 | 84.31 | 0.26 |

**$p < .01$.

Results using repeated measure ANOVA showed that there was no significant difference among the menu designs with respect to two participants' perceptions: the degree of perceived appeal and disorientation of the menu design.

## Discussion and Conclusion

The experiment of three different menu designs was conducted to investigate their effects on information seeking performance, the perceived appeal of each menu design, and the participants' disorientation during information seeking. Three menu designs were compared: a simple selection menu design, global and local navigation menu design, and pull-down menu design.

The results showed that participants performed the fastest information seeking in the pull-down menu design. Pull-down menu design can reduce the number of user actions and the loading time of Web pages that are not necessary to get the destination. Pull-down menus provide jump access to lower levels of the Web site. In other words, users can pass unnecessary pages in order to find information more efficiently in a pull-down menu design than in the two other menu designs.

The findings of this study also showed the significant main effect between two different information seeking strategies: searching and browsing over three menu designs.

Participants performed faster searching tasks in pull-down menu design than in others while they performed faster browsing tasks in the global and local navigation aid menu design. This study supports that the navigation mechanism influences information seeking strategy. Searching strategy is systematic, focused, and directed. People usually use a searching strategy when they have specific target or goal (Marchionini, 1995). When participants search specific information on the Web site, navigation mechanism that reduces additional user's actions to navigate in the system, e.g., mouse-clicking to pass the Web pages between start-point and final page, Web page loading to pass the further level of Web site was effective.

However, when participants used browsing strategy to find their target, global and local navigation menu design was effective. This menu design provides not only structural cues of global and local level but also flexible navigation mechanisms. Moreover, global and local navigation aid provides more information on the content of the Web site. Users who employ browsing strategies to find their target or goal need more information to access in narrowing their target as well as for navigation (Marchionini, 1995). The results of this study support the theoretical assumption that a menu design which provides more structural cues and information, along with flexible navigation mechanisms most effectively helps users perform browsing for information.

This study failed to show significant difference between either the perceived appeal of menu design or participants' disorientation and three menu designs. One explanation for no difference between menu design and the perceived appeal and disorientation by participants is that the entire information structure of the experimental Web site was simple. The information structure used in this study had four selections at each level with total 256 selections. As a result, all participants found the answers of test in each menu designs. The disorientation phenomenon usually occurs when users are unable to fulfill their task goals in the Web site by failing communicating with and manipulating to the system (Hammond, 1992).

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